



FRIDAY, DECEMBER 8, 1876.

THE UNITED STATES INTERNATIONAL EXHIBITION.

XIX.

MISCELLANEOUS.

E. H. ASHCROFT, No. 55 Sudbury street, Boston, exhibited an assortment of various kinds of steam gauges and other boiler fittings. The gauge manufactured by Mr. Ashcroft is the well known Bourdon gauge in which the steam pressure acts against the inside of a flat bent tube. This is shown in fig. 1. A vari-



Fig. 1.

riety of gauges intended for different purposes were exhibited, among them ordinary gauges for indicating steam pressure in stationary boilers, locomotive, hydraulic, vacuum, or what is called a pyrometric or educational gauge, which has a face with three scales, one for the pounds pressure per square inch, another to show the temperature of steam due to the different pressures, and a third the height in feet of column of water due to the different pressures. The manufacturer says of this that "although it is known that high-pressure steam is more economical than low-pressure, it has not been presented to the minds of engineers in a manner as vivid as the pyrometric gauge indicates it. This gauge not only shows the steam pressure, but also its temperature in a most striking manner, and causes a thinking man to consider the important question, how much does every pound of steam costs? He will see that if 10 lbs. pressure, from 0 to 10 lbs. cost 17 degrees of heat to produce it, and that quantity of heat costs 25 cents, or 17 degrees, 14 degrees will produce twice the amount of steam at 80 lbs. pressure to 100. He sees on the dial that 50 lbs. pressure is only 298 degrees of heat, while he is producing over 1,500 degrees of heat under the boiler, and often 1,000 in the chimney, presenting to his mind the great waste that is going on, and that he obtains, in many cases, only one-third of that which he buys; the other is lost by radiation, uncovered steam pipes, bad chimney arrangements, disproportionate grate bars and other causes known to practical men." Now, although we fully believe that such an educational gauge would be extremely useful, yet the explanation, we are afraid, might mislead some, because the sensible temperature of steam gives no indication of that heat which is latent. Thus, if water is heated under atmospheric pressure so as just to reach a temperature of 212°, it will begin to boil; but in order to convert all the water into steam we must continue to add more and more heat until it is all evaporated. The steam at no time will indicate a temperature greater than that of the water when it began to boil. Now, what has become of all the heat which was imparted or added to the water after boiling commenced? We say it has become *latent*, which is perhaps not a satisfactory explanation of the phenomenon, but will do for our present purposes. At any rate, during the process of boiling so much heat becomes latent that a pound of steam of 212 degrees temperature contains nearly six times as much heat as a pound of water at the same temperature. Now, a gauge which gives only the sensible temperature of steam takes no account at all of the heat which apparently has disappeared.

It is also necessary to distinguish clearly between *intensity* and *quantity* of heat. The fact that there may be a very high temperature in the fire and a comparatively low one in the steam is no indication of a waste of heat. However, the pyrometrical gauge is a step in the right direction, and as an educator doubtless will serve a good purpose.

Mr. Ashcroft also exhibited what he calls his "self-testing steam gauge." This is represented in figs. 1 and 2. It consists of a bent tube, S, of the usual form, but the dial has two scales, the inside one, fig. 2, is the *working scale*, and on it the index shows the steam pressure; the outside one is the *test scale*, the purpose of which may be explained as follows: To the arm A, fig. 1, a weight, W, is suspended by the hook H. When the gauge is made, it is tested so as to indicate the steam pressure correctly on the working scale. The weight W is then suspended to the lever A and then subjected to pressure, and the test scale is so adjusted that when the gauge is subjected to any pressure with the weight W suspended from A, the index shall indicate the actual steam pressure on the *test scale*. Therefore the difference between the two scales shows the effect of the weight W, the gravity of which is resisted by the elasticity of the bent tube. Now if the resistance of the bent tube should at any time be changed, then the index would indicate either more or less pressure on the *test scale* with the weight W than it did on the *working scale* without, so that the weight always affords a ready means of testing the condition of the gauge.

For locomotive gauges Mr. Ashcroft employs two bent tubes, or rather the bent tube represented in fig. 1 is divided into two parts, which are attached to the steam pipe at the lower side of the gauge. As shown in fig. 4, the upper ends of the tubes are each attached to a sort of differential lever, which operates the index. The glass faces of these gauges are made air-tight by means of rubber packing shown in the engraving.

Mr. Ashcroft also exhibited an oil-testing machine represented in fig. 4. It is thus described in a report from Mr. Edwin Fithian, Chief Engineer United States Navy, to Commodore Thos. H. Patterson:

"The object of this machine is to test the quality of oils used for lubricating purposes. It consists of a shaft mounted on centres, so as to rotate freely, upon which shaft a drum is fixed, and revolves with the shaft. To this drum brasses are neatly fitted, and held in position and pressed against the surface of the drum by levers and weights; and between the surfaces of the drum and of the brasses the oil is tested."

"Upon the upper brass is a cup, which communicates with the surface of the drum, into which the oil is dropped. The shaft is rotated by a belt and pulley, and the number of revolutions is registered by a counter device operated by gearing from the shaft. Attached to the upper brass is a reservoir of mercury, into which a thermometer is adjusted, which indicates the heat generated by the frictional surfaces as the trial of the lubricant proceeds.

"The principle upon which this machine is based is that of submitting a given quantity of the lubricant to be tested to a frictional action between cylindrical concave and convex surfaces under a fixed pressure, and then measuring the quantity of motion required to use up the given lubricant, determining the time when this is accomplished by the tempera-

ture of the frictional surfaces, which increases rapidly as the lubricant becomes exhausted.

"Four drops of the lubricant to be tested are dropped into the cup from a glass dropping-tube, the temperature noted, the machine set in motion and allowed to run until the thermometer indicates a given degree of temperature at which it would be safe to run the machine—say 200 degrees—as a standard, when it is stopped, and the number of revolutions taken.

"The better the quality of the oil, the longer the machine will run before reaching that temperature. After each experiment the machine was taken apart, thoroughly cleaned, and allowed to cool to the surrounding temperature.

"In order to test the 'gumming' qualities of the oil, it was allowed to cool before cleaning.

"The speed was about 1,400 revolutions per minute. Various kinds of oils were tested, and the revolutions given varied from 11,250 to 15,300 before reaching the given temperature.

"The office of lubricators is to lessen the friction and prevent the heating of metallic bearings by forming a thin film

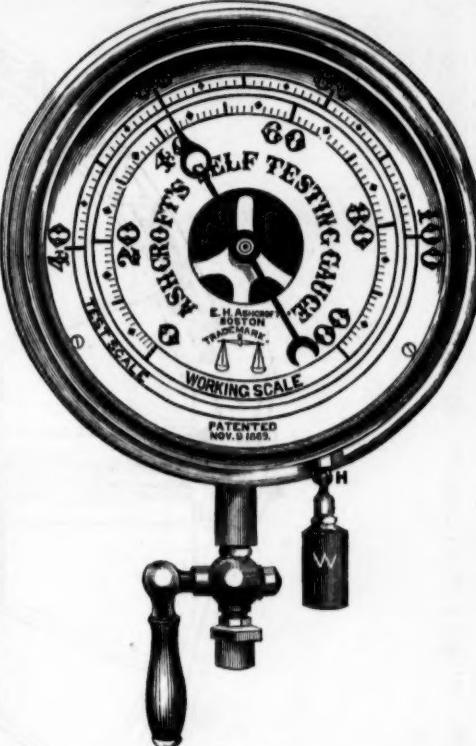


Fig. 2.

between the surfaces. Many machines are operated at a high temperature, which causes rapid chemical decomposition of many lubricating oils; and they, therefore, require the best and most durable lubricators to prevent actual adhesion of the metals."

"Oils of a highly viscous nature solidify or become "gummy" by atmospheric oxidation, and are highly injurious as lubricators. A cheap, practical, reliable and rapid method of determining the true and real value of the different kinds of oils of commerce sold for lubricating purposes is of the greatest importance; and the advantages of this machine are, in my opinion, as follows:

"First.—That the quality of an oil as a lubricator can be as well tested by four drops as by a barrel; and the small quantity required in this machine (4 drops) of each kind to be tested may be always submitted to precisely the same frictional action between the frictional surfaces under pressure uniformly maintained.

"Second.—The number of revolutions is accurately maintained and registered by the machine itself.

"Third.—The increasing temperature is indicated immediately, and tests may be continued at high temperatures.

"Fourth.—The machine is light, compact, and can be set up without expense, and tests can be made in six or eight minutes."

There were also exhibited glass water gauges, revolution counters, Ashcroft's safety valves, pipe tongs, stocks and dies for cutting screws on pipes, and a boiler furnace door which we hope to illustrate and describe at some future time.

THE WAMPUM CEMENT AND LIME COMPANY, LIMITED.—This company, whose works are at Wampum, on the New Castle Branch of the Pittsburgh, Fort Wayne & Chicago Railway, and office at New Castle, Lebanon County, Pa., exhibited a variety of specimens of their cement and the material from which it is made.

It is an artificial cement manufactured from carbonate of lime and a clay which is almost pure alumina. The method of manufacture is similar to that employed in manufacturing English and German Portland cements. The lime stone and clay in their natural state were shown, with specimens of the burnt stone reground; also blocks of pure cement which had been "set," and others composed of one part sand and one of cement, and also concrete composed of five parts of gravel, three parts sand and one of cement; busts and other ornaments molded of one part sand and two of cement, others of four parts ground granite and one cement, and some of four parts furnace clay and one of cement.

The weight of this cement ground is, when loose, 132 lbs. per bushel, and 164 lbs. when shaken. Various tests have been made of its strength; the only one of which we have a record is the crushing of $1\frac{1}{2}$ in. cubes, when seven days old, which bore from 5,400 to 7,700 lbs. Similar sized samples of English Portland cement bore only 5,300 lbs. as a maximum.

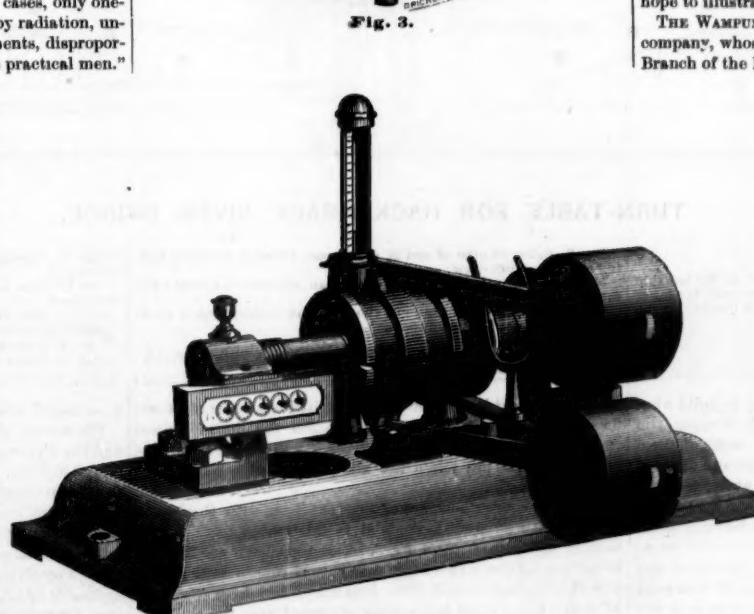


Fig. 4.

The manufacture of the article for the market has been just commenced, but during the winter the company expects to have a series of exhaustive experiments made to determine its strength and other properties. It is known as "Shinn Brothers' Cement," manufactured by the company named, whose officers are Wm. P. Shinn, Chairman; John K. Shinn, Secretary and Treasurer; Joseph A. Shinn, General Manager.

The New Hackensack Bridge.

In perfecting a connection with the tunnel now being constructed through Bergen Hill, the Delaware, Lackawanna &

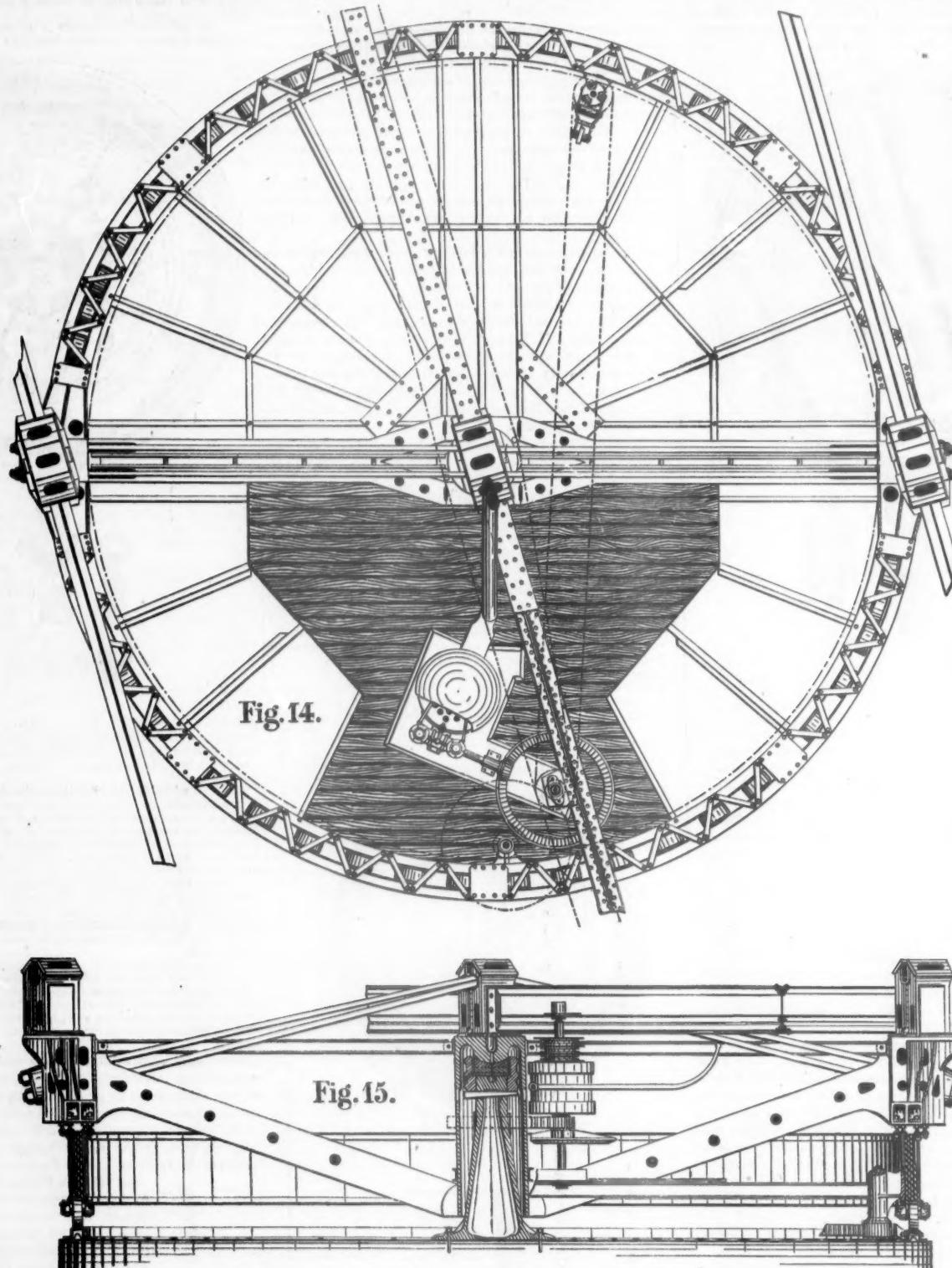
piers and abutments founded upon a timber gridded on piles cut off 35 feet below low water.

The trusses are pin connection throughout, 28 feet high between chords, with end posts inclined. The fixed spans have 13 panels of 15 ft. 3 in. each, and the draw 14 panels of 14 feet each. The angle between axis of pier and centre line of bridge is 75°, and the inclination of the chords to a horizontal plane corresponds with the grade of the track, which is at the rate of 6 inches per hundred feet.

Strains are determined under the assumption of a rolling load of 2,500 lbs. per foot upon each track, the middle truss being proportioned to carry double the load upon each outside

triangle-shaped section, open on the under side and accessible to paint on all sides; at the middle of the centre truss there are 81.3 square inches in all, arranged as follows: Four side plates, 16×9-16 in.; six angles, 3½×5 in., and one cover plate, 22×¾ in.; the inclined end posts and end panels of top chords have 52 square inches.

Cross-sections in each outside truss are about one-half the corresponding dimensions in the middle truss. Vertical posts (fig. 8) are plates and angles built in the form of channel bars, and latticed at right angles to axis of truss. Thickening plates are added at each end, through which holes are bored for the chord pins. The heaviest posts have



TURN-TABLE FOR HACKENSACK RIVER BRIDGE.

Fig. 1. Skeleton of two fixed spans and draw.

Fig. 2. Side elevation of draw span.

Fig. 3. Half plan of draw span, showing the tracks on the left side of the engraving, the top chord and top lateral bracing on the lower side of engraving, and lower chord and lower lateral bracing on the top side of engraving.

Fig. 4. End elevation of bridge.

Fig. 5. Half side elevation of fixed spans.

Fig. 6. Enlarged plan of end of draw-span, showing shaft for locking and unlocking draw.

Fig. 7. Side elevation of end of draw-span, showing the wedge and mechanism for locking.

Fig. 8. Side and end elevations, showing the connections of panel rods with top and bottom chords.

Fig. 9. Plan of same.

Fig. 10. Plan showing connection of lateral braces with top chord.

Fig. 11. Side elevation and plan, showing splice in bottom chord of draw-span.

Fig. 12. Side elevation and plan, showing splice in top chord of draw-span.

Fig. 13. Side elevation of end of floor of draw-span, showing mechanism for lifting the rails on the draw-span.

Fig. 14. Plan of turn-table of draw-span.

Fig. 15. Transverse section of do. do.

Western Railroad Company found it necessary to build what would be equivalent to 29 spans of single-track wrought-iron bridge, varying in length from 60 to 200 feet, many of them under very restricted conditions as to head room and angle of skew. The most important of these bridges is at the crossing of the Hackensack River, a short distance below the present Morris & Essex bridge; and as it involves many features of interest to the profession, we devote much of our present number to a detailed illustration. The structure consists of two fixed spans of double-track wrought-iron bridge, 198 feet each from centre to centre of end piers, and a swinging span of 196 feet between end piers (fig. 1), the whole resting upon masonry

truss. Wrought iron in tension is limited to strains of 10,000 lbs. per square inch, and in compression the limit for fixed ends varies from 8,000 lbs. for 12 diameters to 5,500 for 50 diameters, while for pin joints the above standard is reduced by one-third.

All detail connections are of wrought iron, with the exception of cast-iron joint-boxes and foundation castings at the ends of the inclined posts, fig. 5. The top chords are finished in sections of one panel long, then cut off square at the ends, with the pin-hole bored at a distance of 6 in. from the face. After erection a small splice plate is riveted over the abutting joints. All the iron in each panel is disposed in the form of a

a sectional area of 20.7 square inches and the lightest 9.

The bottom chords are composed of flat die-forged eye-bars, and the diagonal tension members are round bars with eyes forged flat (fig. 8). The bottom chord in fig. 8 belongs to the draw. In the centre panel or middle truss there are eight bars 5×1 9-16 in., and at the ends four bars of 5×1 in., and the pins connecting them are 4 in. in diameter.

The method pursued in forging the heads of these bars, although involving a slight additional expense over the ordinary hydraulic upset, is believed to insure a more perfect connection. Merchant bar is ordered of the full length of the finished eye-bar; the ends are first heated and slightly upset or, rather,

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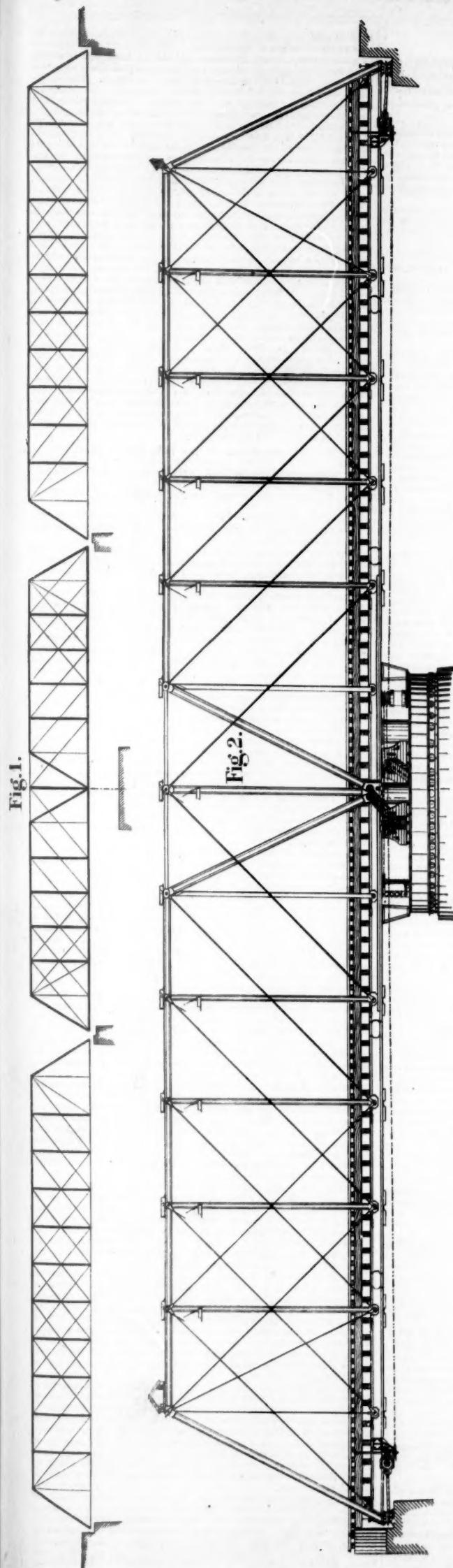


Fig. 1.

Fig. 2.

Fig. 3.

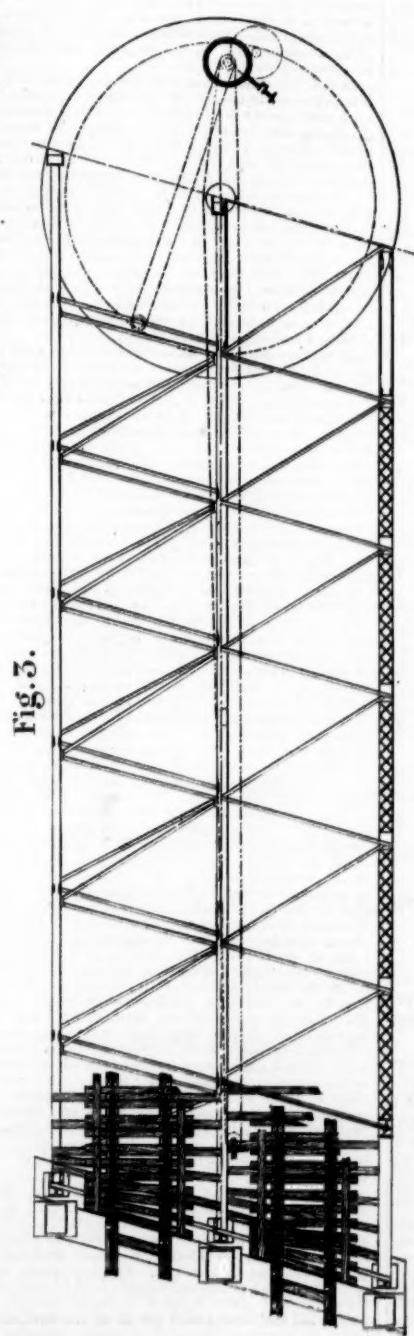


Fig. 4.

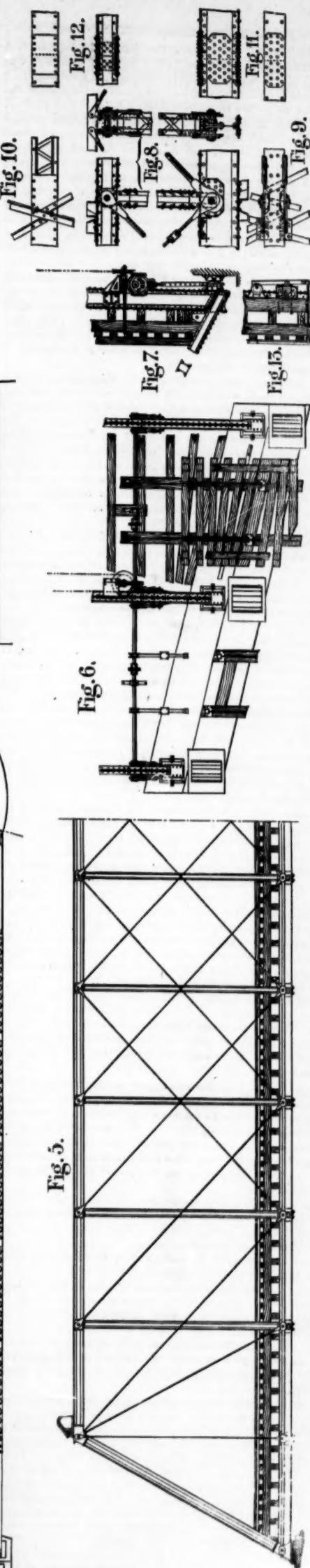
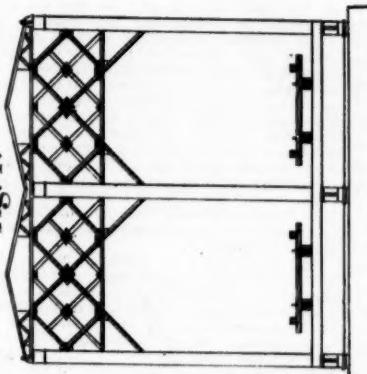


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

BRIDGE OVER HACKENSACK RIVER...DELAWARE, LACKAWANNA & WESTERN RAILROAD (MORRIS & ESSEX DIVISION).

Built by the Delaware Bridge Company, Office No. 32 Wall Street, New York, CHARLES MACDONALD, President and Engineer.

thickened at the point where the eye will begin, and then tapered roughly to a thin edge, and a faggot of scrap sufficient to form the eye is placed upon it and heated to a welding heat; the whole is then drawn down under a steam hammer to the required shape on an anvil having a die for that purpose. When made in this way, the weld passes diagonally through the eye just inside the pin-hole, where there is a large excess of material, and the fibre of the iron on each side and at the back of the pin-hole is disposed in the direction of strain, instead of being seriously distorted, as in the case of the hydraulic upset. Floor beams for the purpose of carrying the track are laid along the centre line of the bottom chords and sustained at panel points by yokes passing over the pins. Those in the middle truss are composed of a web 20 by $\frac{1}{2}$ in., four angles $3\frac{1}{2}$ by 5 in. by 7-16 in. thick, and two cover plates 11 ft. by $\frac{1}{2}$ in. reaching over a length of 10 feet.

The pitch of the rivets ($\frac{1}{4}$) is $2\frac{1}{2}$ in. at the ends, increasing to 4 in. at the centre. Lateral motion is resisted by a system of $3\frac{1}{2} \times 5$ in. angles riveted to top chords, as shown in figs. 8 and 10, and to the top flange of floor beams. In the draw span there are two sets of these laterals (fig. 9). Intermediate sway-bracing is attached to the main posts at a height of 18 feet from the track (figs. 2 and 8).

The swinging span, as shown in elevation in fig. 2, and in half plan in fig. 3, is so arranged that the centre of each truss rests upon the turn-table on a line parallel with the angle of skew, thus obviating the necessity of counter-balancing the long arm. Oscillations are prevented by brackets reaching from the under side of the middle truss to the drum.

The top chords, with the exception of the two middle panels, are built up of angles and plates, as in the fixed spans, but made continuous, so as to resist strains of compression and tension under the varying circumstances of load. The top chord splice is shown in fig. 12.

Bottom chords are also continuous, but the material is disposed, as shown in fig. 8, to resist a bending strain from the track in addition to the direct strains of tension or compression from the truss. As the depth of this I-shaped chord is 20 in., a double system of lateral bracing is introduced to prevent buckling; fig. 11 indicates the method of splicing.

For the first and second panels on each side of the centre of the middle truss, this chord consists of one web $20 \times \frac{1}{2}$ in., six angles, $3\frac{1}{2} \times 5 \times 7-16$ in., and two plates $11 \times \frac{1}{2}$ in., making 42 square inches section; for the remaining panels the angles are reduced to four, leaving 35 square inches. For the outer trusses the corresponding sections are $23\frac{1}{4}$ and $19\frac{1}{4}$ inches.

In the top chord middle truss the panel on each side the centre being subjected to tension only is made up of four eye bars, $5 \times 18-16$ in. The remaining panels are trough shaped and continuous, varying in section from $12\frac{1}{2}$ to 16 square inches.

The central vertical post has 30 inches of section, 2 plates $12 \times \frac{1}{2}$ and 4 angles $3\frac{1}{2} \times 5 \times 7-16$, and the contiguous inclined posts 22 square inches each.

A secure bearing for the ends of the trusses is obtained by wedges controlled by an eccentric movement attached to a cross shaft at each end of the bridge (figs. 6 and 7), motion being communicated to it by chain wheels and worm gear from the centre. Attached to the same cross shaft are smaller eccentrics (fig. 13) actuating levers which lift the rails one inch, so as to just clear the castings upon which the connections between the fixed and moveable rails are made. The bridge may be opened by steam or hand power, as shown in fig. 3, and more fully in the enlarged illustration of the turn-table. The engine has two vertical cylinders, 5×10 in. and a tubular boiler $36 \text{ in.} \times 6 \text{ ft.}$, containing 40 tubes 2 in. $\times 4$ ft., which provides power far in excess of the requirements.

Power from the engine is transmitted first to the wedges through the upper friction pulley and chain wheels, and the bridge is caused to revolve by throwing the lower friction wheel into play, which communicates directly with the driving shaft through a 5-feet spur wheel fitted to the upper end of the driving shaft.

The turn-table is centre-bearing, all the dead weight from the outside trusses being transferred to the pivot by the cast-iron arms and wrought tension-rods shown in fig. 15, while the centre truss rests directly upon the upper casting of the pivot. The wheels in the drum are proportioned to distribute the rolling load over 10 feet of track under each arm, but they are entirely relieved from dead load by a proper adjustment of the main tension rods.

Steel plates 15 in. in diameter and 2 in. thick are provided for the friction surface at the pivot, oil being supplied through grooves radiating from a hole extending down through the centre of the upper bearing casting.

In order to permit of the examination or removal of these plates, the cast-iron ring surrounding them may be dropped down by withdrawing a supporting key, an opening having been left for that purpose in the outside cylindrical casting.

Construction trains have been running over the bridge for some months, with results entirely satisfactory as to its stability. It is thought that the tunnel through Bergen Hill will be completed so as to permit of the opening of this most important connection with the Hudson River by the 1st of January, 1877.

All the bridges on this line, including the Hackensack crossing, have been built by the Delaware Bridge Company (office No. 52 Wall street, New York), of which Charles Macdonald is President and Engineer. This company has just completed a very heavy pivoted lattice bridge across the Hudson at Troy, N. Y., for the Delaware & Hudson Canal Company, and is now engaged in the construction of a bridge over the Des Moines River at Des Moines, Ia., in which the piers and abutments are made up of oak piles inclosed in wrought-iron cylinders and protected from decay by a thorough packing of concrete.

—St. Louis papers state that Mr. E. H. Waldron has resigned his position as General Superintendent of the Ohio & Mississippi, to which he went a little over a year ago from the Cincinnati, Lafayette & Chicago.

Elevated Railroads Condemned.

The following report by Messrs. Wm. J. McAlpine and Egbert L. Viele, civil engineers, in the matter of elevated railroads, has been published and circulated by the Broadway Underground Company, with the depositions of these gentlemen attached:

The undersigned civil engineers, having carefully examined the engineering questions connected with the proposed structure for an elevated railway in various streets and avenues in the city of New York, to be used for the purpose of a rapid transit through said city, submit the following as the result of such examination, which they have verified by their respective affidavits.

The subject-matter to which our attention has been particularly called is embraced in the second of the points of issue, as laid down by the Commissioners in the above entitled matter, to wit :

"In what respect and to what degree, if any, will the construction and operation of the proposed road fail to accomplish the public good anticipated by its advocates?"

The first question which presents itself to us in discussing the point of issue is, what is the character of the road proposed and its form of construction? For the answer to this question, we are referred to the printed proceedings of the Commissioners of Rapid Transit, which has been placed in our hands by counsel.

From these proceedings it appears that the Commissioners, appointed under and in pursuance of Chapter 606 of the Laws of 1875, did, on the 4th day of October, 1875, authorize by resolutions the erection by either or all of three different companies certain structures in different streets and avenues of the city of New York, said structures to be built in accordance with either or all of four different plans, which plans are referred to on pages 281 and 282 of printed proceedings, as "First," "Second," "Third" and "Fourth." These several plans, which are more particularly defined and described on pages 282 to 288 of said proceedings, in 58 specifications, it has been our duty, under instruction of counsel, to examine and report upon. It is proper for us to state in the outset that while the printed proceedings placed in our hands purport to be those of the Commissioners of Rapid Transit, we have failed to detect in any part of these proceedings, or in any resolution or specification, any provision whatever for absolute rapid transit.

The construction and operation of a steam railway does not necessarily imply rapid transit. Many steam railways are the reverse of rapidity in their operation; and unless a rapid rate of speed is positively established and determined upon, and absolutely expressed in hours and minutes for a given distance, it is impossible to determine the capacity of any structure to accomplish the object proposed. No requirement has been made by the Commissioners for any rate of speed that may be regarded as rapid transit, and no provision whatever has been made for a frequency of trains. The character, capacity or form of construction of the rolling stock is also undetermined, undefined and unspecified. That this is a serious and important omission in the beginning of our discussion, is evident from more than one point of view.

In the first place, this valuable and exclusive franchise, which it is proposed to confer for an indefinite period of time, coupled with almost no restrictions, upon a number of private individuals, has for its professed object the securing, not only a means of transit, but a means of rapid transit for the masses of the people through the city of New York. On the other hand those who desire to obtain this franchise are actuated simply by business motives—that is, a desire for pecuniary gain. For this purpose they seek to obtain this great monopoly, this absolute control and occupation of streets and avenues designated. Now, it is plain to the simplest understanding that, unless these individuals are bound by specific requirements as to the time and frequency of transit, these proceedings may actually result in defeating the very object which, in the name of the public, is sought to be attained. Monopolists were never known to be generous, as the constantly-repeated complaints of their impositions amply verify.

The public may find when too late that a great power has been surrendered, which may work an irreparable public and private injury. But the absence of these essential requirements is still more important when it is considered that the formula for accuracy determining "in what respect and to what degree, if any, the construction and operation of the proposed road will fail to accomplish the public good anticipated," is absolutely dependent upon the factors of weight and velocity which have been thus unaccountably omitted and left out of consideration in the specifications and requirements of the Commissioners.

The strength of the structure and its sufficiency for the purpose of rapid transit depends, among other things, upon its capacity to resist the momentum of the trains when brought to a sudden stop. If this momentum were such as to overthrow the structure, it is evident that it would be absolutely unfit for the use it is proposed to make of it. Now, this form of momentum is always governed by the weight of the train and its velocity, or, in other words, the force which the structure is capable of resisting must be equal to the maximum weight of the longest and most heavily loaded train that is to be placed on the structure and the maximum speed at which it may be driven. It is, therefore, positively essential for the interest of the public and for determining the element of safety in the structure, that the maximum and minimum rate of speed and the frequency of trains should be determined in the very outset of the proceedings. In the examination we have made of the specifications embodied in the resolutions of the Commissioners, we find them very general, and extremely indefinite in character; and applying to them the test of such a rate of speed as can be regarded as a rapid transit, we find that the proposed structure is inadequate to offer that resistance to the force of momentum which it will be compelled to sustain, and that its form of construction would render it unsafe and dangerous to life. The specifications appear to be chiefly a compilation and attempted adaptation of the two constructions known as the Greenwich Street Elevated Railroad and the Gilbert Elevated Railroad, neither of which can be regarded as engineering structures. They are both of them rather the conceits of inventors who were ignorant of the right application, the proper adjustment of forces, or of the true nature of the materials used. This fact is clearly exemplified in the Greenwich street structure—which, with the exception of the method by which passengers are balanced on single posts, does not in the least resemble the original structures erected. It has been from the beginning, and still is, a succession of dangerous experiments. Braces and counter-braces, trusses and guards, have been added from time to time to strengthen the weak parts, as use and experience have developed them. From first to last it has been at variance with true engineering principles and in disregard to the great laws of gravity. The incapacity of this structure to sustain a locomotive of sufficient weight and power prevents the attainment of a proper rate of speed. So that, in fact, the rapidity of transit is but little more than what would be accomplished by the horse cars if the stoppages on the street railway were as infrequent as on the steam road. But even with a proper locomotive, any attempt at a higher rate of speed on the Greenwich Street Railway would inevitably result in its destruction. The fact that a terrible accident has not already occurred on this road is no evidence whatever that it will not happen. Unfortunately, its construction has had the effect so to vitiate the public mind in regard to what constitutes a proper mode of quick transit,

that unwary persons, otherwise intelligent, are ready to accept this as the solution of the problem; whereas, by a proper mode of quick transit, much less time should be occupied in going from the Battery to Harlem River than it is practicable on this road to go from Bowling Green to Thirteenth street. The vibrations to which the columns of this structure are so often subjected during the passage and stoppage of trains involves that molecular disturbance which sooner or later will result in the destruction of the strength of the metal, and the consequent destruction of the entire structure. Judging from the indefinite character of the specifications (so called) which are a part of the Commissioners' report, the course pursued in the strengthening and modifications of the Greenwich street road is to be followed in the construction now proposed to be erected, as it is very certain that a proper road cannot be built on these specifications. Yet it is perfectly practicable, and by no means difficult, to determine in advance all the elements in detail of strength and stability required in a properly constructed railway of any description, and such unquestionably should be done in this case, above all others. The most minute details should be determined in the beginning, and not be the subject of experimental tests under passenger travel, involving danger to life. A construction for the purpose proposed should be built upon approved and established principles, or not be built at all. If capital cannot be found to build a suitable railway, it should not be allowed to build a cheap and insecure experiment. As a general rule, the stability of any railway varies with its proximity to terra firma. The solid earth is the best foundation, and every foot that the structure is removed from the earth diminishes its stability. If it is elevated on supports or columns, the leverage which tends to the destruction of the columns increases with the height of the columns, and the greater the elevation the more elaborate and positive in character should be the accessories that are intended to strengthen the structure. The chief destructive elements that are involved in an elevated railway are:

1st. The vibrations due to the lateral movement of the trains.

2d. The oscillations incident to the coning of the wheels and the strength of the winds.

3d. The momentum due to the weight and velocity of trains.

4th. The centrifugal force developed in passing curves, which at high rates of speed would be dangerous to a structure of even slight elevation.

Applying these general rules to the specifications set forth in the proceedings of the Commissioners, and taking them in detail as they are there presented, we find specification No. 1 to be as follows:

"1st. The general plan or plans of the structure shall be of an elevated railway, with the track or tracks supported on two rows of columns. The track or tracks shall be carried by longitudinal girders resting either upon the tops of the columns, or upon transverse girders supported by the columns." In this specification there is no provision for arrested momentum. The longitudinal girders cannot be continuous, in consequence of the necessity for providing for extreme expansion and the vertical posts are thus forced to the disadvantage of a long leverance in offering resistance to the moving force.

Specification No. 2 is as follows:

"When the width of the street between the curbstones does not exceed 36 feet, the plan of construction shall be as follows, i.e., either: First, with a row of columns on line of each curb, and a superstructure carrying two tracks upon transverse girders spanning the street; or, second, with a row of columns upon the line of each curb, and a superstructure carrying a single track over each row of columns; or, third, with Gothic transverse arches spanning the roadway of the street from curb to curb, and carrying longitudinal girders."

The first of No. 2 involves a large excess of material over absolute necessity, being an excess of twenty feet in length on each girder.

The second of No. 2 depends entirely on lateral strength of columns; any deflection from the vertical involves the entire destruction of the structure, and no possible resistance can be offered to any transverse force.

The third of No. 2 is confused and indefinite in description, and entirely at variance with Specification No. 1. At what point the Gothic arches are to receive and carry the longitudinal girders, or in what manner they are to spring or be tied, is left entirely to the imagination. No Gothic arch, as a matter of utility, is known in any engineering structure, and for the purpose here designed it is by far the weakest form of structure possible, and with no aesthetic advantages.

Specification No. 3 is as follows:

"When the width of the street between the curbstones is more than 36 feet, but less than 55, the plan of construction shall be as follows, as the company constructing the railway shall elect: First, with a row of columns on line of each curb, and a superstructure carrying two tracks upon transverse girders spanning the portion of the roadway of the street between the two rows of columns: but this plan is allowed only in the case of a street where there is no existing street railway on the surface of the roadway; or, second, with two rows of columns, the one upon the line of either curb and the other along or near the centre line of the roadway of the street, and a superstructure carrying two tracks upon transverse girders spanning the portion of the roadway of the street between the two rows of columns: but this plan is allowed only in the case of a street where there is no existing street railway on the surface of the roadway; or, third, with a row of columns upon the line of each curb, and a superstructure carrying a single separate track over each row of columns; or, fourth, with Gothic transverse arches spanning the roadway from curb to curb, and carrying longitudinal girders."

In the first of No. 3 there is an excess over absolute necessity in length of girders of 39 feet. The second of No. 3 allows an obstruction in the centre of the roadway which practically divides the avenue into two narrow streets instead of one wide one, and calls for eleven feet excessive length of girder. The third and fourth of No. 3 have the same objections as in the preceding case, while the whole specification refers to an exceedingly imperfect and impracticable structure.

Specification No. 4 differs from the preceding only in one particular; but this is a very important difference, involving the appropriation of a large amount of the avenue through which the road may be permitted to be constructed.

The second division of this specification is as follows: "With two rows of columns in the roadway of the street, and a superstructure carrying two tracks upon transverse girders, but no column authorized in this plan of construction shall be erected between any two tracks of street railroad upon the surface of the roadway."

This phraseology, like most of the other specifications, is somewhat obscure; but the statement is positive that two rows of columns are to be erected in the roadway, which necessarily divides it into narrow lanes instead of one broad avenue; and wherever, as in Third avenue, there is a line of street railway, the whole of the space between the two rows of columns is cut off entirely from public use except for the street railway, since no vehicles will venture to use the line of the surface-track, as the columns prevent the necessary turning out on the approach of the street cars.

Furthermore, the crossing of the avenue being confined to the intermediate space between any two sets of columns, as through a gateway, with the rapidly-moving street cars, always two and sometimes four moving both ways on every block, makes the obstructions to the transverse use of this avenue under such circumstances next to an impossibility, with the imminent certainty of a serious accident. The columns, which in this plan occupy each cross street, are an additional cause of serious obstruction and source of danger.

The base of the columns, with the fenders and guards called for in specification No. 12, would obstruct a very large amount of space from the roadway, being between thirty and forty square yards in each block. In specifications No. 21 and 27 cluster columns are referred to, which are entirely different in their construction from the columns designated and described in specification No. 12, and which column it is intended to use it is impossible even to conjecture. All the remaining specifications, where they are of any material importance in character, are confused in statement and purpose, and they are put together in such a manner that they bear evidence in themselves of a total absence of that thoughtful and intelligent consideration which a master of so much importance, involving values in property unprecedented in the whole history of public improvements in this country, should have received; and when it is considered that upon the stability of this singular structure, should it ever be allowed to be built, there will hang the lives of thousands of our citizens, who may become the hapless victims of a terrible calamity, the mind shudders at the temerity with which such reckless and slipshod specifications are put forth as a proper basis for the construction of a work upon which such vital interests depend, and in this opinion we are safe in asserting that the bulk of the engineering profession will unite.

We are requested to give a supplementary opinion from the first point of issue, which point is as follows :

"What injury to property, whether private or corporate, will be wrought by the construction and operation of the proposed road?" In answer to this we would state that all real estate follows a general law of adaptation to circumstances of location. Following this law, the surroundings of the Central Park have changed from hovels into palaces. The establishment of the emigrant depot at Castle Garden converted the lower part of Greenwich street, once the abode of opulence, into emigrant boarding-houses. A contiguity to shipping involves the conversion of buildings into sailors' boarding-houses and ship chandleries.

Proximity to large markets is accompanied by innumerable truckage establishments and small eating saloons. Some of the routes which have been selected for this steam railway construction have, in accordance with the general law, adapted themselves to certain branches of trade.

The Third avenue, for instance, has become from force of circumstances the centre of a large retail trade for an extensive portion of the city, an adaptation which the presence of a steam railway will unquestionably disturb, if not totally destroy.

The readiness with which the names of certain residents of tenement houses are obtained, in approval of this measure, is evident that they anticipate through it a reduction in the value of property along the line, and to get their rooms now occupied by them at a cheaper rent. It is our experience that in all cities and towns through which steam railways pass, the railway avenues are invariably the localities of depreciated property. We have never known an exception to this general law of the adaptation of property to external circumstances, and the conversion of an avenue into a steam railway is almost equivalent to the conversion of the entire property on the line of the avenue to the same purpose.

In order to understand more clearly what would be the actual effect upon the value of property on the line of a steam rapid transit road, it is necessary first to fully understand the true character of such a road, when it is so constructed as to afford the amplest facilities for such a purpose. Any road that professes to afford such facilities, while, from its very construction, it cannot possibly do so, is an imposition, an innumerable and a nuisance, which ought to be abated. In the city of London is found the only successful rapid transit yet known, and its workings and results afford us the data to aid our judgment in this matter. The mechanical operations and work done on the London quick transit roads largely exceed the operations of any other steam railways of equal length in the world. The traffic on these railways has become very great indeed. On a single line, of eight miles in length, there were conveyed in 1875 over 48,000,000 of passengers, being 25 per cent. more than were conveyed during the same period of time on all the steam railways of the State of New York, over 6,000 miles in length. To accomplish this traffic required the construction and use of locomotives heavier and more powerful than those used for passenger business on any other railway, and the incessant and continuous occupation of the roadway with the trains, running as near together as possible with safety. These trains are long and heavily loaded, which, together with the weight of the locomotive and the necessity of repeated and sudden stoppages, require a roadway exceeding in solidity and stability that of any other railway in existence. Notwithstanding the fact that the road is located on solid earth and masonry, the effect produced by the trains on the substructure and the wear of materials is enormous.

Let us examine for a moment what are the conditions to be fulfilled by rapid transit in the city of New York.

During the year 1875 the number of passengers carried on the street railways was 145,000,000, and by all conveyances, excluding steam, 160,000,000. Seven lines of these street railways averaged 17,000,000 each. Nine of them averaged 14,000,000 each. The Third avenue line alone, in that year, carried 31,500,000 of the 160,000,000 of passengers thus carried in one year. It is fair to presume that the principal line of steam transit would be expected to carry at least 50,000,000.

The effective force of impact possessed by a train at its essential rate of speed, when in full motion, and the force which the structure should be strong enough to resist, would be 10,000 tons. In the various cases of accidents to which all railways are liable, this force, as a general rule, is mollified by the obliquity of its action, and on ordinary railroads it is usually met and resisted by the imbedded road. It is, however, sufficiently powerful to destroy the strongest bridge structure, and all bridges are crossed with extreme care and caution. Now, as the proposed structure for an elevated railroad possesses nothing but the elements of a continuous bridge of the weakest description, its insufficiency for the purpose of rapid transit is apparent. To give this structure the stability of even an ordinary railway would require the erection of solid arches on such foundations as would necessarily absorb so large a portion of the avenue as to substantially destroy it for any other purpose. The continuous passage of trains even upon a firm structure, to the number required for rapid city transit, would have the effect to banish from the vicinity every form of habitation, since life in such a neighborhood would be intolerable. For forty years, the Fourth avenue, with its great breadth of 140 feet, which would otherwise have been the most attractive avenue in the city, suffered to such an extent even from the comparatively few trains, which carried less than 3,000,000 passengers annually, that it remained almost a desert waste until the railway was hidden from sight and sound. Even the adjoining streets, for 500 feet on each side, were nearly untenanted until the taxpayers paid \$3,000,000 to abate the terrible nuisance. Some years ago, a structure similar to the one now proposed was erected on columns in Broadway at Fulton street, and although it was used only by foot passengers, it proved to be such an intolerable nuisance, without accomplishing the object intended, that it was condemned by the Grand Jury and ordered to be removed. Such will be the result in the case, if the avenues of the city are denuded in the manner now proposed, but even the temporary presence of such a structure will, in the forced adaptation of the adjoining property to the circumstances of its existence in the avenue, depreciate values to the amount of many millions of dollars.

(Signed)

W. J. McALPINE.
ROBERT L. VIELE.

TRAFFIC AND EARNINGS.

Railroad Earnings.
Earnings for various periods are reported as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Mississippi & Tenn.	\$469,272	\$455,911	Inc. ..	\$13,361 2.9
Expenses	227,474	244,578	Dec. ..	17,104 7.0
Net earnings	\$241,798	\$211,333	Inc. ..	\$30,465 14.4
Earnings per mile.	4,693	4,559	Inc. ..	134 2.9
Per cent. of exps.	48.48	53.65	Dec. ..	5.17 9.8
Richmond & Peters- burg.....	137,407	164,935	Dec. ..	27,528 16.7
Expenses	77,312	86,684	Dec. ..	9,372 10.8
Net earnings	\$60,095	\$78,351	Dec. ..	\$18,156 23.2
Earnings per mile.	5,442	6,532	Inc. ..	1,090 16.7
Per cent. of exps.	56.27	52.56	Inc. ..	9.71 7.1
Washington & Ohio.	101,640	96,673	Inc. ..	4,967 5.1
Expenses	63,167	69,652	Dec. ..	6,485 9.3
Net earnings	\$38,473	\$27,021	Inc. ..	\$11,452 42.4
Earnings per mile.	1,964	1,933	Inc. ..	31 1.6
Per cent. of exps.	62.15	72.05	Dec. ..	9.90 13.7
Eleven months ending Nov. 30:				
	1876.	1875.		
Chi., Milwaukee & St. Paul.....	\$7,443,635	\$7,567,650	Dec. ..	\$64,015 0.9
Michigan Central.....	6,249,960	6,075,661	Inc. ..	174,399 2.9
Ten months ending Oct. 31:				
Cleveland, Mt. Ver- non & Delaware ..	\$317,831	\$357,975	Dec. ..	\$40,144 11.2
Nine months ending Sept. 31:				
Chicago, Rock Island & Pacific.....	\$5,158,986	\$5,586,586	Dec. ..	\$427,600 7.7
Month of September:				
Chicago, Rock Island & Pacific.....	\$663,940	\$726,473	Dec. ..	\$62,533 8.6
Denver & Rio Gra'de, Main Line.....	33,705	28,929	Inc. ..	4,866 16.8
Expenses	23,055	18,332	Inc. ..	4,723 26.8
Net earnings	\$10,740	\$10,597	Inc. ..	\$143 1.3
Per cent. of exps.	68.22	63.43	Inc. ..	4.79 9.6
Wellington, Grey & Bruce	30,039	28,219	Inc. ..	1,820 6.5
Month of October:				
Cleveland, Mt. Ver- non & Delaware ..	\$37,090	\$42,349	Dec. ..	\$5,319 12.6
Toledo, Wabash & Western.....	422,498	385,154	Inc. ..	37,344 9.7
Month of November:				
Chicago, Milwaukee & St. Paul.....	\$764,982	\$927,029	Dec. ..	\$162,047 17.5
Michigan Central	541,341	595,121	Dec. ..	53,780 9.0
Third week in November:				
Denver & Rio Gra'de, Main Line.....	\$6,644	\$6,641	Inc. ..	\$3 ..
Denver & Rio Gra'de, Trinidad Ex.....	3,310	-----	-----	-----
St. Louis, Iron Mt. & Southern.....	127,000	115,962	Inc. ..	11,038 9.5
Week ending Nov. 10:				
Great Western, of Canada	£16,685	£18,020	Dec. ..	£1,335 7.4
Week ending Nov. 11:				
Grand Trunk.....	£38,200	£45,600	Dec. ..	£7,400 16.2

Grain Movement.

For the week ending Nov. 25 receipts and shipments are reported as follows, in bushels:

	1876.	1875.	Inc. or Dec.	P. c.
Receipts.....	1,144,666	872,180	272,486	31.2
Shipments	832,529	672,927	159,602	23.7
Total.....	1,881,983	1,578,699	57,549,680	60,062,657

Of the lake ports' shipments, 47% per cent. went by rail this year, against 37 per cent. in 1875 and 26% per cent. in 1874.

Chicago receipts and shipments for the week ending Dec. 2 were:

	1876.	1875.	Increase.	P. c.
Receipts.....	1,144,666	872,180	272,486	31.2
Shipments	832,529	672,927	159,602	23.7
Total.....	1,881,983	1,578,699	57,549,680	60,062,657

Buffalo grain receipts for the eleven months ending Nov. 30 were as follows:

	Flour.	Grain.	
By lake.....	1876.	1875.	
777,283	996,499	44,552,680	
By rail.....	1,054,700	582,200	12,997,000
Total.....	1,831,983	1,578,699	57,549,680

Flour being in barrels and grain in bushels. The increase in flour is 253,284 barrels, or 16 per cent.; the decrease in grain, 2,512,977 bushels, or 4.2 per cent. Rail receipts this year were 57.6 per cent. of the flour and 22.6 per cent. of the wheat. The shipments for the same period were:

	1876.	1875.	Decrease.	P. c.
By rail, bushels.....	12,999,727	13,603,712	603,985	4.4
By canal.....	27,778,977	35,480,957	7,706,980	21.7
Total, bushels.....	40,778,704	49,084,669	8,310,965	16.9

The rail shipments were 31.9 per cent. of the whole in 1876, and 27.7 per cent. in 1875. The canal opened May 4 in 1876, and May 18 in 1875.

Norfolk Cotton Traffic.

The receipts of cotton at Norfolk, Va., in November were as follows, in bales:

	1876.	1875.	Inc.'s.	P. c.
Atlantic, Mississippi & Ohio R. R.	59,041	44,934	14,107	31.3
Seaboard & Roanoke R. R.	65,039	46,667	18,372	39.3
Canal and otherwise.....	10,725	9,636	1,089	11.3
Total.....	134,805	101,237	33,568	33.2

Of the receipts this year 86,899 bales were consigned to Norfolk and 47,946 bales were through cotton for points beyond, against 66,232 bales to order and 35,005 bales through in 1875.

Eric Canal Traffic.

The business of the Eric Canal at Buffalo from the opening up to Nov. 30 was as follows:

	1876.	1875.	Decrease.	P. c.
Boats cleared.....	4,860	6,349	1,489	23.6
Tolls collected.....	\$89,549	\$87,731	\$1,861	13.4

The canal opened May 4 in 1876, and May 18 in 1875.

Minneapolis Lumber Trade.

The Northwestern Lumberman makes a comparative statement of the lumber product of Minneapolis for the year ending Nov. 15 as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Lumber manufactured, M. ft.	192,550	152,494	Inc. ..	40,056 26.3
Lumber on hand at close of sea- son.....	112,450	80,362	Inc. ..	32,088 40.0
Shingles, manufactured, M.	89,850	109,160	Dec. ..	19,310 17.7
Shingles on hand at close of sea- son.....	47,800	59,810	Dec. ..	12,010 20.1

There are 19 mills at Minneapolis, and besides these one Anoka mill is included, as its entire product is marketed at Minneapolis.

The amount of logs on hand was 12,396,000 ft. at the close of the season of 1875, but is not given for this year. The stocks

of shingles and lumber reported on hand is that in the hands of Minneapolis manufacturers. Counting that in dealers' hands (Minneapolis being the distributing center for many mills elsewhere) the stocks on hand Nov. 15, 1875, were 158,550 M lumber, 57,800 M shingles and 20,900 M lath.

A very large proportion of this lumber goes down the Mississippi but much of this is eventually distributed by railroads, chiefly to points west of the river, the country east of it being chiefly supplied from Milwaukee and Chicago



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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particular as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

RAPID TRANSIT AGAIN.

With the advent of cold weather, there are indications that New York will have another attack of mental influenza on this subject. Like hay fever and other diseases, it prevails at certain seasons of the year; a severe snow storm being of all other things the greatest predisposing cause of a general epidemic. On another page we have republished the "opinion" of the two eminent engineers, Messrs. Wm. J. McAlpine and Egbert L. Viele, on this subject. This has been issued in pamphlet form and distributed, apparently, to advance the interests of the Broadway Underground Railway, a project which has now been before the public for a half-dozen years or more.

The question which really presents itself is not alone that of a merely local road in New York, or of the company which has projected the line referred to, but it is the much more general one of the practicability of the use of steam power in existing streets of large cities. This is an entirely new question presented by the exigencies of modern metropolitan life and the development of the application of steam to railroads. On this question the opinions of engineers and others are very much divided, one portion holding that it is not practicable to employ steam power in existing streets on roads elevated above the surface, and that the only practicable system of employing steam power to carry passengers or freight at high speeds is by depressing the roads below the existing level of the streets so as to pass underneath the present carriage ways, and if such roads are constructed in existing streets, to arch them over or else build them in open cuts formed by opening new avenues for that purpose. Now the cost of either of these plans will be immensely greater than that of an elevated structure in existing streets. In the one case the cost will be in the neighborhood of \$2,000,000 per mile of double track, without rolling stock, whereas an iron elevated road built in the streets will cost very little if any more than one-tenth that amount. As the cost is so overwhelmingly in favor of elevated roads, what are the objections to that form of structure? It is to this question that the two eminent engineers referred to have chiefly addressed themselves.

Their objections are of two classes, first, the annoyance produced by such roads and the trains running on them to the occupants of the streets, and the consequent

injury and depreciation in value of the property bordering on them. To weigh this question fully it would be necessary not only to consider how much the property along the street on which the road is built is injured and its occupants hindered or annoyed, but also to take into account how much the property and inhabitants on contiguous streets are benefited by such a road. That they are thus benefited may be learned almost any morning from the advertising columns of the New York *Herald*, in which, "near the Elevated Railroad" has become a stereotyped form of recommendation for rooms or houses advertised for rent. But if property is injured by the construction of an elevated road in front of it, there can hardly be any doubt but that the owners should justly be indemnified for such injury. That, however, is a question for the courts and the lawyers to decide, and which it is not proposed to discuss here, and in which the opinions of the distinguished engineers would have much less weight than on matters pertaining to their own profession. It is therefore only the engineering aspects of the case which will be discussed here.

The first objection which is made by these gentleman to an elevated road as specified by the Commissioners of Rapid Transit is that it does not provide for "absolute" rapid transit. Now it seems singular that so vague a term should be used in discussing a subject relating to so exact a science or art as engineering is. What do the gentlemen mean by "absolute rapid transit?" Do they mean a speed of twenty, thirty, forty, fifty or sixty miles an hour; or a still higher speed. In speaking of the structure specified by the Commissioners of Rapid Transit the opinion expressed is, however, not so vague. They say: "the strength of the structure and its sufficiency for the purpose of rapid transit depends, among other things, upon its capacity to resist the momentum of the trains when brought to a sudden stop," and "this form of momentum is always governed by the weight of the train and its velocity," and "the force which the structure is capable of resisting must be equal to the maximum weight of the longest and most heavily loaded train that is to be placed on the structure, and the maximum speed at which it may be driven;" and, "the longitudinal girders cannot be continuous in consequence of the necessity for providing for extreme expansion, and the vertical posts are thus forced to the disadvantage of a long leverage in offering resistance to the moving force," and finally, "the proposed structure is inadequate to offer that resistance to the force of momentum which it will be compelled to sustain, and that its form of construction would render it unsafe and dangerous to life." Now it will be observed that these statements are very specific, the conclusion very sweeping, but entirely dependent upon the soundness of the premises. The problem involved may be simply stated thus: What is the maximum force exerted by the momentum of train on an elevated railroad, and can the latter be made to resist it safely? It is stated by these gentlemen that "the force which must be resisted is the weight of the train and the maximum speed at which it is driven," the meaning of which is not clear. Probably what they had in their minds was the well-known rule that momentum "is the mass of any body multiplied by its velocity in units of distance." But in this case, what units of distance? If the speed of the trains is "absolute," it is hard to assign any value to the units. Fortunately, however, in this case no such abstruse calculations are needed, because, no matter what the speed of a train is, or the perfection of the brakes employed, all that can be done is to slide the wheels, which will subject the structure to a strain equal to the friction of the wheels on the rails, so that the maximum force to be resisted is not proportional to the speed. The friction of the wheels is easily calculated, and will never amount to more than about one-fourth of the weight of the train, so that the problem presented is: Can an elevated road be built to resist a horizontal strain equal to the friction of the wheels exerted longitudinally at the top of the rails? The fact that it is stated that "the longitudinal girders cannot be continuous" leads to the inference that the momentum of that portion of the train on one pair of girders must be resisted by the post or posts alone which support the girders. Although it is true that the girders cannot be made continuous, yet a portion of the strain on one pair of girders is transferred to the adjoining posts by the friction between the posts and girders, due to the weight which the latter bear. On the Greenwich street railroad large square longitudinal guard timbers are employed alongside the rails to prevent trains from getting off. These timbers are bolted to the cross-ties and the latter to the girders, and as it is not necessary to allow for the expansion and contraction of wood due to changes of temperature, these guard timbers are made continuous, and thus effectively transmit the momentum over an indefinite length of the structure, even though it were impossible to make each post strong enough to resist the friction of the wheels on the rails when the brakes are applied suddenly. Supposing the weight of a train to be 2,000 lbs. per foot of track on a span of 60 ft., with an

adhesion of the wheels equal to one-fourth the weight they bear, the force exerted on the post if the wheels should slide, supposing that none of it is transferred to the adjoining ones, would be only 30,000 lbs. There would be no difficulty whatever in making a post of the height required for an elevated road to resist such a strain safely.

The fact, too, that there are so many iron bridges, some of them erected on iron columns or towers hundreds of feet high, which are in daily use on the railroads of this and other countries, is strong evidence that the conclusions announced above rest on supports very much weaker than the posts are assumed to be.

The engineers whose opinion we are discussing also say "that the vibrations to which the columns of this structure (the Greenwich Street Railroad) are so often subjected through the passage and stoppage of trains involves that molecular disturbance" which sooner or later will result in the destruction of the strength of metal, and the consequent destruction of the entire structure." Now, what "molecular disturbance" is meant? The expression is too indefinite. "Molecular disturbance" is a subject about which we are too ignorant to affix any value to it in engineering calculations. There are some phenomena which are incomprehensible to us, and we speak of them as indicating "molecular disturbance;" but none of us dare to say exactly what is meant by the expression. It is presumed that what was meant was that the structure is subjected to strains greater than experience has shown that such structures can safely bear; which possibly may be true, but it certainly could easily be verified by exact calculation.

It is further stated that "the chief destructive elements that are involved in an elevated railway are, first, the vibrations due to the lateral movement of the trains." Now that this is not practically injurious to such structures is shown by the endurance of iron bridges on ordinary railroads. "Second. The oscillations incident to the coning of the wheels and the strength of the winds." If the coning of the wheels has this effect, why cone them? There are thousands of wheels running without being coned, and practically they do as well as those which are. The only effect of the winds on an elevated road which would differ from that on an ordinary railroad would be that its force exerted laterally might be greater than that of the strength of the structure to resist it in that direction; but that, too, is easily calculable. "Third. The momentum due to the velocity of the trains;" which has been already discussed. "Fourth. The centrifugal force developed in passing curves, which, at high rates of speed, would be dangerous to a structure of even a slight elevation." If this is true, why "run at high rates of speed" on curves. The streets of New York nearly all run in straight lines, so that curves will necessarily be few, and therefore a diminished speed at such places will not interfere seriously with the operation of a road of this kind.

The other considerations discussed in the pamphlet before us, relating to the effect of building an elevated railroad in existing streets, not being strictly engineering questions, we will not discuss at present, excepting to call attention to the fact that the injurious effect of the railroad on Fourth avenue on adjoining property was due largely and chiefly we believe to the danger resulting from having the tracks on the surface of the street and also to the great difference in the character of the traffic and rolling stock employed. On Fourth avenue the heaviest class of engines, cars and trains were run. The crossings of the streets were often obstructed by long freight trains, and the frequent deaths and injuries to persons caused by these trains running at high speed on the surface of the street indicated the danger to inhabitants living in the vicinity. With an elevated road the element of danger would be entirely eliminated, and there would be as much difference in the character and appearance of the light cars and trains on the one road compared with those on the other, as there would be between heavy freight wagons and light carriages driven on an ordinary street.

The problem, as was stated at the beginning of this article, is not a merely local one, but it involves the very important question whether steam power can practicably be employed in streets for transporting passengers rapidly and cheaply. We believe that this can be done without as great injury to property as is apprehended, and that the application of steam power in this way will effect a change in the character of metropolitan life and will do much to overcome the great and increasing evils of overcrowded population. When, therefore, two engineers so distinguished as Mr. McAlpine and Mr. Viele pronounce an opinion announcing so decidedly the impracticability, from an engineering point of view, of elevated steam street railroads, we feel that such an opinion should be sustained by some better reasons than those which they have given, especially as an elevated road is now operated very successfully in this city. We may have something to say in future about the best form

*The italics are ours.

for such roads and their relative advantages compared with underground lines.

Recent Defaults.

There have been recently some additional failures of railroad companies to meet their obligations, which have reminded us that the troubles beginning in 1873 have not yet come to an end. The rates prevailing on sections of through routes between New York and the Mississippi have been so extremely low as to explain a failure in such roads; but only one addition has been made to these of late. Perhaps the most painful instances are those of companies which had failed to meet their obligations once before since the panic of 1873, and, having made an arrangement with the creditors for a temporary lessening of their yearly interest payments, now are unable to perform what they promised then. There will probably be many more cases of the kind. The process of funding coupons gives relief while it lasts, but it assumes that after the time agreed upon the favored debtor company will be able to earn and pay all that it had originally promised, and usually a little more. What is essential to the companies' keeping their agreement is that they should be doing better than when the settlement with the bondholders was made. Unfortunately the times have not grown better very fast with the general business of the country, and perhaps bankrupt railroads have, on the average, improved least of all. Expenses have been reduced, business sometimes increased, but rates have usually gone down to such an extent as to neutralize the advantages so gained to a great extent, if not wholly. The company which in 1874 said, "We cannot pay the \$2,000 of interest per mile which we owe, because, on account of the hard times, we only earn \$1,000 net: if you will fund your coupons for four years, we will resume payment in 1878" — this company is nearing the time when it must fail again if it cannot command \$2,000 a mile a year. We might congratulate ourselves that so far there have been but few cases of this second failure if we did not remember that scarcely any of the arrangements required a resumption of full payment of interest until after 1876.

Below we give some account of three companies which have recently become involved in difficulties, two of them for the second time within three years.

THE KANSAS PACIFIC.

Apparently most of this company's bonds are held in Germany and Holland. The company, having a funded debt of about \$21,000,000 at the time, besides the second mortgage guaranteed by the Government (the interest on which has always been paid by the Government), made its first default in November, 1873, when a half-year's interest on \$7,000,000 became due. Its officers then explained to the bondholders that the cause was not insufficiency of net earnings, which indeed were reported that year to be \$200,000 more (one-sixth more) than the interest charge for the year; but to a pressing floating debt incurred for the construction of two new branches, the bonds of which were found unsalable, contrary to expectation. Early in 1873 an agreement with the bondholders was made, by the terms of which the latter were to fund the two coupons due next after October, 1873, and one-half of the next five coupons. This gave $3\frac{1}{2}$ years during which it had to pay but five-fourteenths of the interest accruing, the balance being funded into interest certificates which at the close of that period would amount to about \$2,750,000 in currency, and add \$4,000 per mile to the funded debt of the road. The amount required for interest by this arrangement (after the first year, when none was to be paid) was about \$625,000 a year in currency, or only about \$900 per mile of road.

According to the company's reports, the net earnings were \$1,685,704 in 1874 and \$1,572,880 in 1875. For the ten months ending with October the gross earnings reported are \$273,000 less than the last year. Down to the close of 1875, however, the net earnings appear to have been about \$2,500,000 more than was required for the interest payable meanwhile, and were \$700,000 more than would have sufficed to pay interest in full on all the bonds but the incomes. A considerable part of the yearly earnings, amounting at the end of 1875 to nearly \$800,000, is withheld by the Government, though one half of it is due by the decision of the Supreme Court; but aside from this (only part of which has accrued since 1873) the net earnings appear to have been every year larger than the interest on the funded debt. The company has issued reports yearly, but so far as we can learn has never given any information as to the disposition of its net earnings during the past two years.

The coupons due Nov. 1 last were the last (on those bonds) to be half-funded in accordance with the agreement, so that the company's second default is made on that arrangement itself. The causes assigned in the directors' circular for this failure are a reduction in net earnings due to competition and the dullness of trade, inability to collect \$500,000 due from the Government, and "the institution by informers of malicious suits against the company," which are said to have utterly destroyed "the remaining credit of the company," and which could not have been brought "except by the authority and with the consent of the Attorney General of the United States." It was by the advice of the directors that receivers were appointed, and one of their number and their Secretary are the appointees, at whose suit we have not learned. Mr. Villard, the director appointed Receiver, is a member of the Frankfort bondholders' committee, part of the agreement for funding being that they should have the choice of two directors whose consent should be required for any expenditure for new construction.

The Kansas Pacific was one of a brood of roads subsidized by the Government and originally intended to be branches of the Union Pacific. When it had been determined to build a railroad to the Pacific by Government aid, one of the diffi-

culties was to determine what town should be its Eastern terminus. This difficulty was solved in the politicians' way, by giving a terminus to pretty nearly all places on the Missouri that wanted one—Sioux City, Omaha, Atchison, Leavenworth and Kansas City—while still another branch aimed in the general direction of Memphis and New Orleans. However, Congress seemed to think better of this before all the branches were completed, and really only the Sioux City & Pacific actually made a connection with the through line. But the Kansas Pacific was diverted from its proposed junction with the Union Pacific at the 100th meridian by the design of its promoters, we believe, they hoping to get a government subsidy for a longer line than that would have been. And probably it is better that the line was built west to Denver rather than northwest to the Union Pacific. However, if no mistake was made in going to Denver, a serious one was made in building the part of the road in Western Kansas so far north. If the line had been turned from the valley of the Kansas to that of the Arkansas somewhere west of Topeka, the company would have had very much better land on some hundreds of miles of its road, and its land grant would also have been more valuable; while it would then have occupied the ground which the Atchison, Topeka & Santa Fe has since built its line over, very greatly to the injury of the Kansas Pacific, and would probably have had no competition in Western Kansas for many years to come. The newer road intercepts the droves of Texas cattle before they reach the Kansas Pacific, and divides with it the trade of Colorado and New Mexico.

THE ST. LOUIS, IRON MOUNTAIN & SOUTHERN.

This company, or rather the company from which it developed—the old St. Louis & Iron Mountain—was for a time one of the most promising lines south of the latitude of St. Louis. Its early days had been troublous enough, it is true; but when it had changed its gauge to 5 feet, and had completed its line to the Mississippi, opening the only line over which cars could run through between St. Louis and the whole system of railroads south of the Ohio, it seemed on the high road to prosperity; and when, soon after, the extraordinary activity in iron manufacturing gave it a heavy local traffic in the inexhaustible ores produced on its lines, it seemed not unreasonable to think of dividends at an early day. In 1871 its net earnings were at the rate of \$3,196 per mile, and in 1872 they were \$3,364 per mile, the gross earnings in the latter year having reached more than \$10,000—which is more than some roads receive which pay 10 per cent. dividends regularly. Then, too, the yearly interest charge on the funded debt was but about \$1,830 per mile (though there was a large floating debt). The net revenue had nearly doubled since 1870, and in view of the progress then made, which was expected to continue, there seemed to be a solid foundation for the security of the second mortgage, which added about \$1,650 per mile to the interest charge after 1873.

But at this time the company was making great extensions through two companies under its auspices which constructed the long line from the Mississippi opposite Cairo southwest diagonally across the whole State of Arkansas to the Texas border, —the old Cairo & Fulton Railroad, endowed by Congress with a land grant as far back as 1853, and by many thought to be a most promising line, as it had a whole State to itself, almost, and would give the most direct outlet to the greatest of all the States, which had (and has) but one other rail connection with the rest of the world. Unfortunately, it was overvalued, and the charter, carrying a land grant of 6,400 acres per mile, was probably too dearly bought. When the line was completed, the Cairo, Arkansas & Texas Company with 70 miles of road through a country with very little traffic had issued \$2,000,000 of stock and \$1,500,000 of 7 per cent. gold bonds, and the Cairo & Fulton, with 304 miles of road, had a debt of about \$9,000,000, while a large addition was made to the old company's debt on account of the extension which connected it with the Cairo & Fulton. The new roads were constructed when prices were at the maximum; they passed through a thinly peopled, slightly cultivated country which makes very little progress; the large land grant attaching to them was not salable, or sold very slowly; the chief hope of the line was in the fact that it reached by a direct route the immense, fertile, rapidly growing State of Texas.

In May, 1874, the three companies were consolidated and the St. Louis, Iron Mountain & Southern formed. It had then or soon thereafter a funded debt of

\$4,000,000 1st mortgage bonds (currency 7s) on the St. Louis & Iron Mountain;

\$5,927,000 2d mortgage bonds (gold 7s) on the St. Louis & Iron Mountain;

\$2,500,000 1st mortgage bonds (gold 7s) on the Arkansas Branch;

\$1,500,000 1st mortgage bonds (gold 7s) on the Cairo, Arkansas & Texas;

\$8,000,000 1st mortgage bonds (gold 7s) on the Cairo & Fulton;

\$930,000 income bonds (currency 8s) on the Cairo & Fulton;

\$2,000,000 consolidated bonds (gold 7s) on the St. Louis, Iron Mountain & Southern.

This is an aggregate of \$19,927,000 of bonds bearing gold interest and \$4,930,000 bearing currency interest. With price of gold 110, this gives a yearly interest charge of \$1,894,400 currency, or at the rate of \$2,765 per mile.

In February of last year the company, finding itself in difficulties, asked the holders of all the bonds except the St. Louis & Iron Mountain first mortgage to accept interest-bearing certificates for the three coupons next maturing, the number being increased to four for the St. Louis, Iron Mountain & Southern consolidated and the Cairo & Fulton income bonds, the object announced being to enable the company to pay off a heavy floating debt. The interest-bearing certificates when all issued would add \$2,269,356 to the funded debt of the company, all but \$158,000 being payable, principal and interest, in gold. The floating debt at the beginning of 1875 was the very large amount of \$3,254,148—at the rate of \$4,750 per mile.

By the terms of the arrangement then proposed, which was duly accepted by the bondholders, the company was to resume payment of the coupons of the St. Louis & Iron Mountain second-mortgage bonds on the 1st of November last. This it

failed to do; it paid half the face of each coupon, stamped on it the amount paid, and returned it to the owner.

In a circular to the bondholders the President of the company says that this failure to resume payment in full is due partly to a deficiency in net earnings, the receipts having been somewhat less and the expenses somewhat greater than were anticipated when the agreement with the bondholders was made, and partly because it has been practically indispensable to make payments aside from ordinary expenses amounting to a very large sum, but "not contemplated by the circular of 1875." The whole amount of these payments from 1, 1875, to Sept. 1, 1876, was \$843,000, of which \$458,500 was for new construction and real estate, representing additions to the company's property. The remainder, \$384,700, has been paid for interest on funded debt accruing prior to March 1, 1875, and for interest on floating debt. It is common in railroad reports to assume that expenditures for new construction may be avoided entirely, but we do not remember an instance where they were entirely avoided, and in the case of a new road like this it seems that the probability of some such expenditures ought to have been assumed in making up the calculations for the future. As for overlooking interest charges already accrued on the funded debt and on a floating debt of more than \$3,000,000, that seems preposterous.

In accepting the arrangement proposed by the company, the bondholders subordinated their immediate claims to those of the floating-debt creditors. They did this deliberately, however, for the payment or reduction of this debt was one of the objects proposed by the funding scheme; and considering the position of the property this was probably a wise course. We must remember that the interest has continued to be paid on the first-mortgage bonds of the St. Louis & Iron Mountain road, which alone has considerable net earnings, while the other lines separated from it would probably be quite profitless. It was estimated when the arrangement was made that \$2,266,000 of this floating debt would be liquidated by the close of this year. The expenditures "not contemplated" and the reduced net earnings have not permitted this, but down to the end of August last \$1,217,500 of that debt had been paid. The payment of so much of this debt, however, made it impossible to resume payment of interest in full, the estimated deficiency down to the close of this year being \$356,600. The net earnings of the year are expected to be about \$1,500,000, while the interest on funded debt accruing meanwhile is nearly \$2,100,000. If there are fairly good crops in Texas next year, it is thought reasonable to expect available net earnings of \$1,750,000; but this would be \$450,000 less than the interest on funded and floating debt. A resumption of interest payment on all classes of bonds thus seems impossible, the more so as it is indispensable to the economical working of the road to reduce the floating debt. The interest which it is most important to pay is that on the St. Louis & Iron Mountain first-mortgage bonds, which always has been paid, and that on the certificates into which the unpaid coupons have been funded, as a neglect to pay this latter revives the coupons with all the rights of the holders. The amount of interest on these is about \$457,000 currency, and if these were paid there would remain of the estimated net earnings of next year about \$1,300,000. More than \$100,000 of this would be required for interest on the floating debt. If the company continues to pay one-half of the coupons of the other bonds, this will absorb nearly \$800,000 more, and it will have left about \$400,000 to apply to the reduction of the floating debt and contingencies.

The company's great misfortune is the amount of its debt. The funded debt, including the coupons already funded, is at the rate of nearly \$40,000 per mile (mostly gold), and the yearly interest charge, reduced to currency, is \$3,015 per mile. Besides this there now exists a floating debt of \$2,900 per mile. This is not wholly a burden, for it is hardly possible to work a railroad without a considerable amount of unsettled accounts payable, as well as of accounts receivable; but this company's floating debt is about \$2,000 per mile too great, and it is safe to say that such an excessive debt costs much more, directly or indirectly, than an equal amount of funded debt, though interest may be paid on very little of it. With such a debt, a company makes its purchases and secures its employees at a great disadvantage. But making no allowance for this debt, the company, with the working expenses and other necessary expenditures as they have been for the past two years, needs gross earnings at the rate of \$8,160 per mile to enable it to pay the entire interest on its funded debt. This is a large amount for a new road.

In favor of the prospects of the road are the rapid growth of Texas and the extension of those railroads which are most likely to contribute traffic to the Iron Mountain road. Probably no other State is growing so rapidly, and a large part of the immigration is to districts which will send much of their produce northward. Should the growth of Texas continue for some years yet, and no more railroads to the North be constructed, the Iron Mountain road will probably become solvent and prosperous; should there be a tolerable immigration to the vicinity of the road in Arkansas (of which, however, there is no present prospect), the road would become independent of the through Texas business, from which now most is to be hoped. Another resource, likely at some time to add very largely to the earnings, is the iron ore traffic; this may of itself some time support that part of the road over which it passes, now about one-eighth of the whole.

THE OHIO & MISSISSIPPI.
This is an old railroad mostly through a well settled country, extending between two of the greatest cities of the West and connecting with still another. It is part of a short line between St. Louis and Baltimore. Its position ought to secure it a fairly large traffic, and it really has such a traffic. It has not, however, a very large local traffic, southern Indiana not pro-

duing so much for shipment as the prairie country farther north and west. A very large proportion of the traffic is through to and from St. Louis, and this is a business for which the competition is very sharp, and the rates usually very low. Still, the net earnings for the year ending with June last were at the rate of \$1,990 per mile on the old road, which is 7 per cent. on \$26,850.

The net earnings are small, it is true; but that is not more a cause of the company's embarrassments than the amount of its capital account, which (for the old road) is at the rate of about \$28,000 in bonds, \$10,000 in preferred stock (with dividends cumulative) and \$50,000 in common stock per mile. The recently acquired Springfield Division would reduce this capital per mile, but it has its own funded debt, which appears to be more than the road is worth (its net earnings last year were but \$300 per mile), and is, we believe, just what it cost the Ohio & Mississippi Company. At least it is only very recently that this new acquisition has had effect on the fortunes of the company.

The company has not yet failed to pay any coupons due, but has gone into the hands of receivers at the request of its officers, apparently because the floating debt had become unendurable. It was reported to be nearly a million and a quarter on the 1st of July last, and includes, we understand, very large arrears of wages due employees—a debt which takes precedence of all others. The past season must have been very trying to the road, as the rates received on a very large part of its business were probably considerably less than the cost of doing the work. The receivers are two of its directors, one its own President and the other the Vice-President of the Baltimore & Ohio. We hear of no statement to the bondholders, who as yet have had all their claims paid. The Court, however, will direct the payment of employees and all current working expenses from the receipts, and this will probably prevent full payment of the coupons next due. It is rumored that a large part of the bonds are owned by persons interested in the Baltimore & Ohio, and that there will be a foreclosure and purchase in the interest of the latter company. It, probably, could make better use of the road than any other single company, though if it owned the road, the latter might lose some of the business which it now gets to ports north of Baltimore. In ordinary times it ought to be able to earn the interest on all its own bonds; those of the Springfield Division, if there is a foreclosure, may have to take care of themselves.

The Grain Movement for Thirty-one Weeks.

The shipments of grain of all kinds from the eight principal Northwestern markets for each week since April 22 have been, in bushels, by lake and by rail:

Week ending—	By lake.	By rail.	Total.	Per cent.
April 29	1,824,541	2,072,946	3,707,487	46
May 8	2,445,191	2,292,633	4,737,824	48 1/2
" 13	1,536,626	2,302,940	3,841,466	60
" 20	1,602,170	2,016,304	3,618,474	55 1/2
" 27	1,747,408	1,820,456	3,567,864	51
June 3	2,412,162	1,797,923	4,210,084	42 1/2
" 10	2,894,915	2,147,670	5,042,585	42 1/2
" 17	2,921,406	2,391,811	5,313,218	45
" 24	2,728,706	2,198,054	4,926,760	44 1/2
July 1	1,821,155	1,784,548	3,605,703	49 1/2
" 8	1,765,010	1,205,184	2,970,194	40%
" 15	1,648,508	1,238,678	2,877,186	42%
" 22	2,269,356	1,082,825	3,302,161	31%
" 29	1,466,502	1,038,205	2,504,710	41%
Aug. 5	2,065,243	1,288,268	3,358,511	38%
" 12	1,744,059	1,300,720	3,044,779	42%
" 19	2,180,292	1,614,256	3,764,548	42%
" 26	2,362,152	1,520,811	3,872,968	39%
Sept. 2	1,698,491	1,578,058	3,271,549	48%
" 9	2,374,473	1,815,411	4,192,884	43%
" 16	2,963,634	1,688,318	4,651,952	36%
" 23	2,268,894	1,820,361	4,089,255	44%
" 30	2,497,357	1,797,847	4,225,204	42%
Oct. 7	3,009,394	1,650,888	4,660,252	35%
" 14	2,530,729	1,835,991	4,366,720	42%
" 21	2,673,847	1,900,837	4,474,484	40%
" 28	2,635,237	1,359,160	3,994,397	34
Nov. 4	1,850,048	2,351,914	3,902,862	60%
" 11	2,422,157	1,399,994	3,822,151	36%
" 18	1,867,483	1,372,271	3,239,754	42%
" 25	1,406,993	1,272,758	2,679,746	47%
Total for 31 weeks....	67,026,718	52,791,007	119,817,725	44

The shipments for the last week have been smaller but once since navigation opened, and more than a third less than the average since August. Nearly all the loss has fallen on the lake vessels. The rail shipments are less than before, but not much less than for the two preceding weeks. Next week's report will nearly make an end of lake shipments, as insurance is refused at this season.

For the same 31 weeks the receipts at the different Atlantic ports have been:

	Per cent. of total.	Per cent. of total.	All grains, of total.
New York.....	21,265,648	35.1	55,801,005
Boston.....	6,441,178	10.7	9,258,550
Portland.....	547,600	0.9	940,170
Montreal.....	3,492,281	5.8	11,376,476
Philadelphia.....	19,680,225	22.5	20,815,975
Baltimore.....	15,050,300	21.6	16,485,285
New Orleans.....	2,000,415	3.4	3,052,304
Total.....	60,437,647	100.0	117,532,764

The receipts of the week were unusually large, a much larger proportion than usual going to New York, which, compared with the previous week, has gained largely in rank in corn and very largely in receipts of all grains. Boston gained a point in corn, but lost in all grains; Montreal lost in both, and in the latter its loss was considerable; Philadelphia lost considerably and Baltimore a little less in both. A great complaint at Philadelphia of the impossibility of getting cars for grain will perhaps explain why that port has not kept up its proportion of its receipts. The amount of its (and Baltimore's) receipts is not remarkably small; but the total receipts have been larger than usual and these ports have not shared in the increase. Meanwhile, canal boats on their last trip were arriving at New York.

Of the total receipts, about 30 per cent. was wheat, and five-sixths of this went to New York.

For the week last reported the proportion of the total corn arriving at each port was: New York, 43%; Baltimore, 19;

Philadelphia, 17%; Boston, 10%. The corresponding percentages for grains of all kinds were: New York, 67%; Philadelphia, 9%; Boston, 6; New Orleans, 3%; Montreal, 2%.

New York has not before this year received so large a proportion of the grain arriving at the seaboard.

Errata.

In Mr. Wellington's paper last week considerable error was made in Table J, in the column headed "Value per mile of avoiding addition to grade of 1 ft.," by pointing off the three digits to the right with a comma instead of a period, making all the amounts one thousand times too large. There was also an error in fact in stating the amount of curvature on the Cincinnati Southern Railway between Somerset and Hunnicutts as 80° per mile; it should be 106°.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Chicago & Lake Huron.—The new track from Flint, Mich., is extended west by south 10 miles.

Chicago, Milwaukee & St. Paul.—The new connection between the La Crosse Division and the River Division, including the bridge over the Mississippi near La Crosse, Wis., is 2 miles long.

Wisconsin Central.—Extended from Flambeau River, Wis., north to Butternut Creek, 8 miles, and from Penokee south to Chippewa River, 12 miles, making 20 miles in all.

Joplin & Girard.—Extended east by south 10 miles to Baker township, Mo.

South Pacific Coast.—Extended southeast 9 miles to Santa Clara, Cal. It is of 3-ft. gauge.

This is a total of 51 miles of new railroad, making 2,153 miles completed in the United States in 1876, against 1,176 miles reported for the corresponding period in 1875, 1,731 in 1874, 3,456 in 1873, and 6,559 in 1872.

NEW PUBLICATIONS.

Digest of Railway Decisions. By John F. Lacey of the Iowa Bar. Chicago: Callaghan & Co. 1875.

This work, issued so long ago, should have been noticed before, as it is one likely to be serviceable to a large class of railroad officers as well as to lawyers. In lieu of an opinion of our own on this work, we copy one, published at the time the work appeared, from the *Central Law Journal*, which is a legal journal edited by eminent lawyers, and apparently careful in its judgments. Its notice of the book was as follows:

"The scope of this work is correctly indicated by the title page: 'A Digest of Railway Decisions comprising all reported American cases in which a railway company is a party, and all other cases in which railway law is determined.' Its extent appears when we state that it contains 932 double-column pages. It is elegantly printed, and is highly creditable to the enterprising publishers."

"The author has done his work carefully and well. It has all the requisites of a first-class modern digest—appropriate titles and subdivisions—a running head at the top of the page—a catch-word in full-face type at the head of each section—cross-references—table of cases and of overruled cases, and an analytical index.

"Almost the only criticism to which the work seems to be open relates to its plan, and not the execution of the plan. It is a mistake to include in a digest of railway law cases whose only connection with that topic is the accidental circumstance that a railway corporation happens to be a party. Many text-writers and digest-compilers make a similar mistake, without avowing it. There is a constantly acting temptation to err in this respect. The practicing lawyer will, however, we imagine, rather regard this feature of the work of Mr. Lacey as adding to its practical value, since he knows that if every case in which an American railway is a party is included in it, he will be quite certain to find any given case he is searching for, and will also feel an assurance that no case relating to railways is omitted. We commend Mr. Lacey's digest as a useful and excellent work."

Railroad men who do not know what a "digest" is may think that such a work would be too extensive and too technical for their use. It is not, however. The citations under each head are usually very brief, but are intended to cover all that has been decided on the subject. As an example, under the head of "Injuries to Domestic Animals," and the first sub-head thereof, "Negligence," the first three of 57 abstracts of decisions are as follows:

"1. *Acts of Negligence*.—Where there was nothing to obstruct the view of the engine-driver for half a mile in advance, it was held to be negligence to run into cattle upon the track without making any signal or any attempt to slacken the speed of the train. *Chicago & North Western Railway Co.*, v. *Barrie*, 55 Ill., 226, 1870.

"2. The leaving of cars upon an inclined plane insecurely fastened, with the full knowledge of the danger of such a practice, constitutes gross negligence. *Battle v. W. & W. R. Co.*, 66 N. C. 343, 1872.

"3. *Accidents*. A railroad company is not responsible for the value of a mule which passed through a gap in the fence near the railway, jumped on the track only about 50 yards ahead of the locomotive, and was killed by an inevitable collision, there being no proof of negligence, unskillfulness, defective machinery or recklessness. *Louisville & Nashville R. R. Co. v. Wainscott*, 3 Bush (Ky.), 149, 1877.

This sample of the work will enable the lay reader to understand its nature. Of course, from its nature, it gives the substance of the law as decided in all railroad questions that had come before the courts at the time it was compiled.

November Meeting of the Master Car-Builders' Association.

The regular monthly meeting of this Association was held at its rooms, No. 113 Liberty street, New York, on Thursday evening, Nov. 16. The meeting was called to order by the President, Mr. Leander Garey. The death of Mr. A. Steinbach, late Treasurer of the Association, was announced and a committee appointed to draft suitable resolutions.

A brief discussion then ensued upon the advisability of changing the day of the monthly meetings. On motion of Mr. Hill it was decided that the matter be allowed to lay over until the next regular meeting.

The "Cost of Carrying Dead Weight of Cars" was then announced as the subject for consideration at the meeting. According to announcement, Mr. M. N. Forney opened the dis-

cussion. He said that it would be remembered that at a meeting held last winter this subject of dead weight of cars came up. There was considerable discussion of the subject, and it was apparent from what was said that there was great deal of misapprehension about the actual cost of carrying dead weight. What he wanted to do this evening was to point out to the audience the expenses of operating a railroad which are affected by the dead weight of cars, and in order to do this he would call attention to the expenses of operating the Lake Shore & Michigan Southern Railway. In its reports it gives the expenses under various heads in percentages of the whole cost of operating. These taken from the report of 1875 are as follows:

	Per cent.
General office expenses.....	* 2.05
Conductors and trainmen.....	5.94
Enginemen and firemen.....	7.02
Agents and station labor.....	* 17.35
Telegraph repairs and supplies.....	* 0.24
Gaslight account.....	* 0.35
Repairs engines and tenders.....	6.63
car.....	* 9.00
roadway and track.....	* 14.42
rail account—steel and iron.....	7.06
Repairs bridges.....	* 0.54
fences.....	* 0.67
buildings and fixtures.....	* 2.64
Fuel consumed.....	11.82
Oil and tallow.....	1.45
Waste and rags.....	0.36
Office, train and station supplies.....	* 2.06
Damage and loss, freight and baggage.....	* 0.43
Hire to property and cattle killed.....	* 0.12
Personal injuries.....	* 0.45
Law expenses.....	* 0.47
New York office.....	* 0.29
Rents payable.....	* .69
Outside agencies and advertising.....	* 2.38
Contingencies.....	* .12
Hire of cars.....	* 5.77
Total.....	100.00

Now by glancing over this list of expenses it will be seen at once that many of them, such as "general office expenses" and "agents and station labor" would not be influenced at all by the dead weight of cars. Others are affected to only a very slight degree. In the above table the former are marked with a * and the latter with a †. By adding each of these up it will be found that 44.50 per cent. of all the expenses are not affected at all by the dead weight carried, 22.59 per cent. only to a very slight degree, and only 32.91 per cent. in proportion to the amount of work done. To show how the latter occurs, let us make a calculation of the proportion which the dead weight bears to the whole weight of a train of cars. Let it be supposed that we have a train of thirty of the heaviest freight cars and that each of them weighs 20,000 lbs. and carries 24,000 lbs. of freight. That would make the loaded car weigh 44,000 lbs., and the whole train of cars would therefore weigh 1,320,000 lbs. Now suppose that we can reduce the weight of each car 4,000 lbs. and still retain the same carrying capacity. The weight of the whole train would thus be reduced 120,000 lbs. so that we could add to it three more such loaded cars and thus make the total weight of the train the same as in the first case.

The first train consisted of thirty cars, each of which carried 24,000 lbs. of freight, or a total of 720,000 lbs.; the second train consisted of 33 cars, each carrying 24,000 lbs., or 792,000 lbs. of freight. Now observe that the total weight of these two trains is exactly the same, and therefore the cost of conductors and trainmen, locomotive runner and fireman, repairs of engines and tenders, fuel, oil and tallow, waste and rags, will be exactly the same in the one case as in the other, but with this difference, that the one train would carry 72,000 lbs., or ten per cent. more freight than the other. Now doing ten per cent. more work at the same cost is equivalent to saving ten per cent. of the expenses incurred in doing that work. These expenses as drawn in the table amount to very nearly 33 per cent. of the total expenses, so that apparently, by reducing the weight of the cars as assumed, we reduce that portion of the total expenses 10 per cent., which is equal to 3 1/2 per cent. of the whole cost of operating the road.

But besides the train expenses, there are other portions of the cost of operating a road, which, as has been pointed out, are lessened by reducing the dead weight of cars. These, it will be seen, are chiefly the repairs of track and rails. As we are not aiming at any very exact figures, but only trying to show the general principle which underlies the subject, it may be assumed that only one-half the cost of repairs of roadway is at all influenced by the weight which passes over this road. The decay of cross-ties, cost of ditching, influence of rain, frost, labor of repairs, etc., are either quite or almost entirely independent of the weight which passes over them. But let it be assumed that one-half the cost of repairs of roadway and of all the other expenses marked with a † are reduced in proportion to the total weight which passes over them, and we then have 11.29 per cent. of the expenses subject to such reduction.

Let us see what the difference is in the total weight carried. The two trains of cars weighed each 1,320,000 lbs., to which should be added 100,000 lbs. for the engine and tender, making a total of 1,420,000 lbs. The one train, however, carried 720,000 lbs. = 360 tons of freight, and the other 792,000 lbs. = 396 tons.

It must be remembered, however, that in ordinary traffic of our roads, for every five loaded cars there are three empty ones hauled, so that in order to get at the weight carried per ton of freight we must add three-eighths of the weight of the cars and engine in each train to the weight which is given. This would be 262,500 lbs. in the one case and 235,500 in the other, so that the weight of trains carried in transporting the amount of freight named will be 1,582,500 lbs. to carry 360 tons of freight, or 4,396 lbs. per ton. In the second case, with the lighter cars, the weight of trains will be 1,555,500 lbs. to carry 396 tons, or 3,928 lbs. per ton—a difference of a little over 10% per cent.—so that the saving effected in track repairs, etc., etc., would not exceed 10% per cent. of 11.29 per cent.=1.18 per cent. of the total expenses, which, added to 3.33 per cent., would amount to a little over 4 1/2 per cent. Now this looks very attractive and is almost enough to make a good dividend on the stock. But it is subject to some very great drawbacks. It will be observed that the chief cause of economy is due to the increase of the amount of freight hauled per train. Now, unfortunately, in a large proportion of the trains run on our roads no such increase is possible. This is true of nearly all passenger trains. They must be run whether there be one car or ten, ten passengers or a thousand. In such cases the train expenses are diminished to an almost inappreciable amount by reason of the lighter load. Probably more than half of the trains run even on our main lines are of this kind, so that we must subdivide our 4 1/2 per cent. and reduce it to 2 1/2. Then, too, it is believed that the practical men present will agree with the speaker in believing that an average reduction of 4,000 lbs. in the weight of all classes of cars would be absolutely impossible. With platform, coal and some other classes of cars there is not enough excess of weight to permit of such reduction with safety, so that it is believed that the saving in weight with the most skillful design and construction could not be made to exceed one-half that, which is assumed, so that our 2 1/2 per cent. of economy must be subdivided again, and is reduced to 1 1/2

it would be difficult to detect in keeping account of the cost of repairs of track and road-bed, and it must be admitted that the saving which can be effected by reducing the dead weight is brought down to very narrow limits. It is not said, be it understood, that there is no advantage in reducing the dead weight of cars. A saving in the neighborhood of one per cent. is certainly worth looking after; but not as much saving can be effected in this way as the speaker once thought, and as is now believed by many persons.

Mr. DAVENPORT—The argument of Mr. Forney was a very ingenious one, and I am afraid of being carried over and of adopting his views. But there are some points he did not touch upon. Increased weight involves increased expense in construction. A car that weighs 20,000 lbs. will cost more than one which weighs 16,000 lbs. Every time the heavy car is repaired it is attended with increased cost of repairs. Mr. Forney has endeavored to show us that we have overestimated this thing, and I am now arguing to keep us from going over to the opposite extreme. I do not think that the overestimate will be so great as would at first glance appear from Mr. Forney's reasoning.

Mr. PARTRIDGE—There are sometimes cars on the various roads that will show a variation in weight of 6,000 lbs., at least if the stenciled figures are to be relied upon. The figures that have been shown when calculated out give by no means small results. There would be a material reduction, amounting perhaps to a ton per car. That was not a general saving on that plan, but merely bringing all the stock down to what they considered the best weight for their standard cars.

Mr. FORNEY—I do not mean to argue that it is not desirable to reduce the dead weight, but when you attempt a reform there is likely to be as much injury as good done if you overstate your case. What I contend is, that this has not been properly done. The average train has been increased. If you could reduce the weight of your cars, so as to increase the average train one-tenth, you are saving just as much as if you saved 10 per cent. of the expense of engineers and firemen and all other expenses. Then, too, you may fall into the egregious fallacy of the narrow-gauge advocates. I can hardly think that practical car-builders will be led to believe the weight of cars can be reduced by merely putting the rails nearer together. You have only got to see the cars on the New York Elevated Railroad, which is a standard-gauge, or the cars exhibited at the Centennial that were built 30 or 40 years ago, and weigh not over 12 tons and carry 48 passengers, so that I think these weights are quite as light as any of the narrow-gauge weights. One reason why this question of dead weight has been so misrepresented is, as I say, this epidemic of narrow gauge. In order to induce persons to supply money for building narrow-gauge roads, the projectors of them have exaggerated the saving which can be effected by reducing the dead weight of cars.

Mr. PARTRIDGE—When I first looked into this matter of dead weight, it was in consequence of some of Mr. Forney's arguments against narrow gauge. I studied the subject with reference to cars intended for standard gauge, and in doing so did not design to sacrifice strength to a reduction of material. Having arranged the material so as to resist the strains, the superstructure was reduced all it could bear. The result was, the cars were very much lighter than those of the ordinary construction, in which if any given piece was big enough it didn't matter how much too big it was if it would go into the space intended for it. The result was that, in one case, a train of four cars was made up and run at perhaps 35 miles per hour. The cars jumped the track on to the frozen ground; the heavy cars injured their trucks, but the trucks of the lighter cars were much less injured. This is a case where the increase of dead weight was a decided detriment to the car itself, and made it really weaker than the lighter car. The saving was not in the essential parts.

Mr. GAGEY—While there is no question as to the desirability of decreasing dead weight, it seems to me that corresponding gain can be made by increasing the carrying capacity of cars. There are cars now running on four wheels weighing 5,650 pounds with a capacity of eight net tons. There are some with eight wheels, 34 feet long, that are carrying 16 and 17 tons successfully. That would, in my opinion, be the direction in which dead weight can be reduced—by an increase of capacity. The box cars are now supposed to carry nine or ten tons; the 8-wheel cars weigh about ten tons, and if we add one ton of dead weight and half the carrying capacity, it would materially reduce the dead weight. Perhaps some of the wheel manufacturers present can suggest some way of reducing the weight of cars by reducing the weight of wheels.

Mr. DAVENPORT—We have pared down our wheels until the weight has been reduced 40 pounds per wheel, which would be 320 pounds per car. In talking to a railroad man on the subject the other day, he said his road required a wheel of a certain weight. I said to him that if he was to get statistics from a neighboring road that was using the lighter wheels, we would find a jury of impartial men to decide that the wheel had never failed; and, in fact, their record showed they were doing better than other wheels. It didn't make any odds, he said; his wheels were large and he didn't want a wheel unless it was of a certain weight. I replied that I would not add a pound to please him or any one else. He was not a master car-builder, I am very happy to say. I never heard one of them talk that way. Now I think while railroad companies have the purchasing of their materials in the hands of such men, our efforts to improve rolling stock will not be entirely successful. I think that, as our President says, there is room for very great improvement in the increase of the capacity of cars. If we can say to the superior officers that we have now perfected a car that will carry 15 tons, and we can be permitted to put the 15 tons into them, we will then be in the line of progress. Increased weight and increased strength are not synonymous, as all of us know who have noticed the construction and weight of bridges. Bridge-builders have materially lessened the weight of bridges without diminishing their strength, and car-builders should work upon the same principle. We have all seen timbers in cars that have at some point been cut away so that they were not nearly as strong as they appeared to be; and then we find that the car crippled at such points. I have known strungers that were cut away more than one-half, and which had not half the strength they seemed to have. We should try to avoid this more in future, and it is already being done by many builders.

Mr. BAKER, of the Pennsylvania Railroad, said he had always built light cars and never heavy ones. Freight cars on his road have been running from eight to fifteen years, and they have neither truss, bolt nor bolster, nor even a mortice for the posts. The pillars and top plate are bolted together, and are as straight to-day as at first. All the brace they have is a $\frac{1}{4}$ in. plank inside. These cars weigh 18,000 pounds.

Mr. J. B. HILL, at the suggestion of the President, exhibited a model of a baggage car roof framed without carlines,* by using straight sticks running from the plates to the opposite upper corners of the raised roof and crossing in the centre, the object being to obtain the entire strength of the grain, and use timber that would not otherwise be available. He said he had built several roofs upon this plan, in which he could utilize all the material to a greater extent than when curved pieces were introduced. He was not now prepared to give the cost as compared with that of a crooked roof, but would do so at some future time.

Mr. C. A. SMITH referred to the fact that the Pennsylvania road would not allow of any increased length of grain cars,

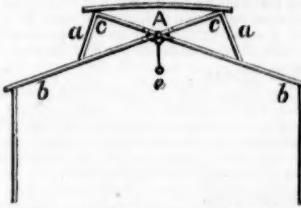
for the reason that the grain depots would not admit them without great inconvenience. They must have the cars of standard length.

Mr. V. D. PARKER believed in an increase of carrying capacity. He referred to a style of car used on his road that he had commenced building three years ago. He had, perhaps, 110 cars of this pattern and had not expended a dollar on them for repairs. They had been thoroughly tested by carrying a piece of a monument weighing 20 tons, and at another time a heavy drop casting weighing 23 tons. They were not in these instances in regular freight trains, but run by special engine. With the Master Car-Builders' standard axle and journal, these cars would safely carry 20 tons. We added no extra weight to the car in building it on in the manner of framing, but it was made stronger, and the transom beam was seated in a cast-iron pocket. He had no doubt there were thousands of box cars running which would carry 15 tons as well as 8 or 9, if their trucks were strengthened by adding heavier axles.

Mr. C. A. SMITH spoke of sundry light cars built several years ago at the shop of the Pennsylvania Railroad, and especially of the trucks, which were extremely light. There was hardly any limit to the carrying capacity of cars if the axles were strong and the journals large enough to run cool. The New York Central is now using 8-ton 4-wheel cars, and running them successfully. He referred to an accident near Newburgh in which two cars were thrown from the track, one weighing 21 tons and the other 15 tons. The trucks under the former were badly broken, while those under the latter were but slightly injured.

The PRESIDENT called the attention of Mr. Forney to the model which Mr. Hill had brought, and requested that he would give some explanation of it.

Mr. FORNEY—I can only say about it that as far back as 1863 and 1864, when I was in the employ of the Illinois Central Railroad, I proposed the building of a roof in that shape. My plan



was not adopted. The idea has remained in my head ever since, and it occurred to me to make it public. Mr. Hill discerned some merit in it, and he constructed a car on that plan. I do not see the use of cutting a piece of wood across the grain, when you can use it with the grain just as well. I think you will find that the same sort of roof as that now in use is employed in Gothic churches. I think that the Gothic style of roof is not the strongest form. They are obliged to build buttresses to prevent the walls from spreading. In modern times, instead of building a buttress, we put a rod there. This Gothic construction originated when iron could not be procured, as it can be now in any shape desired.

You doubtless all know about the rage that prevails now in regard to Eastlake furniture. Eastlake's theory is that all furniture should be constructed in the strongest way and with the best possible workmanship. But since this style has become fashionable all sorts of furniture—constructed in utter disregard of the principle referred to—has been called by that name. You have noticed that many of the old Gothic churches, owing to the great weight and size of the doors, they are compelled to use very large hinges, and that in order to relieve those hinges of unctuousness they have them elaborately ornamented and spread out in fantastic shapes and designs. Eastlake's theory was that we should do as they did—not hide the hinges, but make them ornamental. The humbug that I alluded to, consists in using ordinary hinges and sticking on big plates for show.

Now cars might be built and ornamented on the principle advocated by Eastlake and others, or, to state as a distinguished art critic did, "Ornament your construction; but do not construct your ornament." The car roof exhibited by Mr. Hill is, I think, constructed on the true Eastlake principle and is capable of very beautiful ornamentation.

Mr. SMITH—I have an impression that some three or four years ago, when this matter of light cars was before the Association, it was put in the form of a resolution that each master car builder should ask his superior officers to allow him to build one or more light freight cars. I don't know whether anyone has complied with that or not, but it looks to me that that is the point to come at. Let them go to the extreme if they want to, in lightness. Suppose they do make a mistake they can strengthen the weaker parts. Let them build as light a car as they possibly can with the standard size, and put it into use with others, and see what it will do. My impression is that that is the only way that you will ever ascertain how light a car can be economically used by railroads.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Mississippi & Tennessee.—At the annual meeting in Memphis, Tenn., Nov. 15, the following directors were chosen: F. M. White, A. T. Lacey, Memphis, Tenn.; R. P. Neely, Bolivar, Tenn.; E. C. Walther, Nat. Howard, Grenada, Miss.; A. M. West, Holly Springs, Miss.; N. B. Sledge, Como, Miss.; John Robertson, De Soto County, Miss.; H. S. McComb, Wilmington, Del. The board elected H. S. McComb, President; F. M. White, Vice-President; S. H. Lamb, Secretary and Treasurer; M. Burke, Superintendent; A. J. Knapp, General Ticket Agent.

Feitor & San Lorenzo.—The first board of directors is as follows: C. H. Gorrell, Santa Cruz, Cal.; James P. Pierce, Santa Clara, Cal.; John S. Carter, C. G. Harrison, W. T. Tisdale, San Francisco. The office is in Santa Cruz, Cal.

New York & New England.—At the annual meeting in Boston, Dec. 5, the following directors were chosen: Wm. T. Hart, James Sturgis, Edward W. Kinney, Lewis Hecht, George W. Baldwin, Boston; George M. Rice, Worcester, Mass.; Jesse Metcalf, Gorham P. Pomeroy, Providence, R. I.; John F. Slater, Norwich, Conn.; Frederick J. Kingsbury, Waterbury, Conn.; Le Grand B. Cannon, R. Sydham Grant, Charles Dana, James Roosevelt, New York; Thomas Dickson, Scranton, Pa. The new directors are Messrs. Metcalf and Pomeroy, who replace James Y. Smith, deceased, and Royal C. Taft, resigned.

Bangor & P. sotaquiza.—Mr. Arthur Brown has been appointed Superintendent. He has been for some years connected with the Maine Central, as Agent at Brunswick, and as Superintendent of the Androscoggin Division.

Connecticut Valley.—At the annual meeting in Hartford, Conn., Nov. 28, the following directors were chosen: James C. Walkley, George Beach, N. Hollister, T. B. Cooley, Elizah T. Smith, E. R. Wiggin, Hartford, Conn.; Samuel Babcock, Arthur W. Bacon, Middlefield, Conn.; Luther Boardman, East Haddam, Conn.; S. M. Comstock, Essex, Conn.; Oliver H. Clark, Chester, Conn.; Isaac Arnold, Haddam, Conn.; John W. Marvin, Saybrook, Conn. The board elected Samuel Babcock President; L. Boardman, Vice-President; Levi Wood-

house Secretary and Treasurer; Samuel Babcock, E. R. Wiggin, Luther Boardman, James C. Walkley, F. B. Cooley, Executive Committee.

Charlotte, Columbia & Augusta.—At the annual meeting in Columbia, S. C., Nov. 24, the following directors were chosen: R. R. Bridgers, J. W. Thompson, S. B. Alexander, A. B. Davidson, of North Carolina; John B. Palmer, T. W. McMaster, T. J. Robertson, J. H. Bion, A. B. Springs, B. D. Townsend, L. D. Childs, J. J. McLaren, of South Carolina; W. E. Jackson, J. O. Matthewson, Josiah Sabley, David Dickson, of Georgia; B. F. Newcomer, W. T. Walters, Baltimore; Charles Estes, Mayor of Augusta, Ga., is director ex officio. The board re-elected John B. Palmer President; C. Bonbright, Secretary.

Jacksonville, Pensacola & Mobile.—Mr. Edward M. Cheney has been appointed General Superintendent, in place of F. C. Spooner, resigned.

Bedford, Brownstown & Madison.—Capt. Samuel McElfatrick has been appointed Chief Engineer.

Ohio Falls & White River.—The first board of directors of this new Indiana company is as follows: William Howard Irwin, William F. Reid, O. H. Stratton, W. H. Ongley, E. Kampf-miller, Alvin J. Slack, Frank E. Clarkson, Alexander Worrall, J. N. Robinette, E. Lockhart, H. C. Wilson, D. J. Long, Samuel Cleaver.

Richmond & Petersburg.—At the annual meeting in Richmond, Va., Nov. 28, Mr. F. R. Scott was re-elected President, with the following board of directors: B. W. Haxall, Henry K. Elliston, Richmond, Va.; Dr. D. W. Lassiter, Petersburg, Va.; R. R. Bridgers, Wilmington, N. C.; W. T. Walters, Baltimore.

Missouri Pacific.—Mr. Wm. Wilson has been appointed General Master Mechanic. He has been for some time in charge of the Aurora shop of the Chicago, Burlington & Quincy.

Providence & Springfield.—At the annual meeting in Providence, R. I., Dec. 4, the old board was re-elected, as follows: Amos N. Beckwith, Sidney Dillon, Moses B. I. Goddard, James O. Inman, Horace A. Kimball, Edward Pearce, John L. Ross, Albert L. Sayles, Wm. Tinkham. The board re-elected Wm. Tinkham President. The board re-elected Wm. Tinkham President; Jabez C. Knight, Clerk; F. W. Grammont, Treasurer.

Pennsylvania.—The Philadelphia City Council has elected George Morrison Coates, Alexander M. Fox and Wm. Ansreich city directors in this company for the ensuing year.

Long Island.—Mr. D. N. Ropes, of Orange, N. J., has been chosen President in place of Conrad Poppenhusen, resigned.

Ohio & Mississippi.—St. Louis papers state that General Superintendent E. H. Waldron has resigned and that Mr. E. H. Graves is in charge of the road as Acting Assistant General Superintendent.

M. F. Seehler.—M. F. Seehler is appointed General Master Mechanic, in place of C. E. Gore, resigned. His office is at Vincennes, Ind. Mr. J. P. Coulter, late of the Springfield Division, is appointed Master Car Builder, in place of F. F. Hagedorn, resigned. His office is at Cochran, Ind.

PERSONAL.

—Mr. C. E. Gore, General Master Mechanic, and Mr. F. F. Hagedorn, Master Car Builder of the Ohio & Mississippi, have resigned their respective positions.

—Mr. Conrad Poppenhusen has resigned his position as President of the Long Island Railroad Company.

THE SCRAP HEAP.

A Prophetic Item.

The Kingston (N. Y.) Freeman gives the following prophetic extract from the Poughkeepsie Eagle of 18—, the Eagle, like others in that thriving city, having "bridge on the brain" just now: "The rumor that the steamer Drew on her passage from Albany to New York Wednesday night had been driven by the storm against one of the piers of the Poughkeepsie Bridge and had sunk in sixty feet of water with a fearful loss of life and a total destruction of vessel and cargo, is wholly unfounded in fact. The report seems to have grown out of the capsizing of a fisherman's boat at that place, the only result of which was the abutment of the Poughkeepsie and the loss of a few suckers. Moreover, such a catastrophe is rendered impossible by a very novel arrangement in the construction of the bridge. By an immense universal-joint the top of each pier is hinged to the bottom of the bridge. On a pier being struck by any large moving body, as a vessel, a spring is disengaged, the bridge at that point is deflected upward, lifting the pier off its base and allowing it to swing outward, like a pendulum, away from the colliding object. Sailing masters are hereby notified that no attention need be paid to the piers, as no harm can possibly result by encountering them."

"P. S. The patent for the above ingenious device is held by a gentleman of this city."

Carried by Weight.

The Cattaraugus Republican of recent date says: "A joke recently gotten off by one of our portliest citizens upon himself is too good to keep:

"An elderly lady quite poor in flesh and of diminutive stature, was riding on the D. A. V. & P. R. The conductor asked her for her fare, which she paid grumbly. Noticing our friend of the 300 avoirdupois, more or less, in front of her, and that the conductor passed him by, she broke out with the exclamation: 'How is it that the conductor takes no fare of you, while the rest of us have to pay?' 'I will tell you, madam—I go as freight—by weight!'—an answer that seemed fully satisfactory to the questioner, who quietly subsided."

Weight of English Passenger Cars.

An article in the Edinburgh Review says: "In cases of collision it was found the old carriages suffered most. As trains became longer, therefore, and speed more rapid, it was necessary to make carriages larger and heavier; and experience has proved that increase of weight means decrease of tear. Of the carriages now used on the Metropolitan line, the first, second and third-class carriages weigh respectively 15, 14.75 and 14.25 tons, and seat 48, 64 and 80 passengers. The weight of the locomotive engine has also steadily advanced."

This gives a car weight of 700 lbs. per seat for first-class passengers, 511 $\frac{1}{4}$ lbs. for second-class, and 399 lbs. for third-class passengers.

Compliments to a Railroad.

A Yamhill County correspondent writes as follows to the Portland (Oregon) Bee: "The mail route between Portland and St. Jo is out of repair. Oh, for the days of the old stage coach, when we had no expectation and were not disappointed."

"Land slides," "track jumpings," "engine fizzles," etc., are becoming disagreeably frequent along the line of the rickety, crumbling ghost of a railroad between these points. We advise the company to put their road in a shed and hire a cayuse pony to carry the mails. This will insure regularity any way."

Improvements in Sleeping Cars.

The East St. Louis Press of Nov. 25 says: "Tom Grant, Pullman conductor on the Southeaster, has invented one of the most useful articles attached to a sleeper. It is a sliding

*Illustrated in the Railroad Gazette of Sept. 4, 1875, page 367. The cut above is the same as then published.—EDDIES.

clamp on the arms of the upper berth to prevent the closing of that part in case of a turn over or wreck. It is held just above the hinges where the berth is closed, and as soon as it is opened the porter loosens a set screw and moves the clamp over the hinge, making the two joints of the arm as one solid piece of iron, so that it is impossible to work the joint, thus preventing the berth from coming together. This patent will save many a traveler from being smashed and smothered to death. This inventive genius has also applied for letters on a portable step, to be used in getting on and off a car. It is held without a brace and a passenger can get on or off from either side of the two platforms with the aid of this one step."

OLD AND NEW ROADS.

Southern Railway Security Company.

Notice is given that, in accordance with a resolution of the stockholders of this company, and in compliance with the directions of the committee appointed for the purpose, Mr. W. T. Walters will receive at his office, No. 68 Exchange Place, Baltimore, Md., bids in writing for the purchase of the following property: 6,871 shares Richmond & Petersburg stock; 2,952 shares of stock and \$600,000 convertible income bonds Wilmington, Columbia & Augusta; 9,129 shares Northeastern (of South Carolina) stock; 4,513 shares Cheraw & Darlington stock; 13,024 shares Charlotte, Columbia & Augusta stock; 10 shares South Carolina Central stock; \$11,000 Wilmington, Columbia & Augusta first-mortgage bonds, and certain real estate in Atlanta, Ga. Particulars as to the real estate can be had from the agent, G. W. Adair, in Atlanta.

Indianapolis, Cincinnati & Lafayette.

In the United States Court at Cincinnati, Dec. 2, a petition was filed by C. Blackburn and others, asking for the removal of Mr. M. E. Ingalls and the appointment of some other person as Receiver. The petition alleges as a reason that Mr. Ingalls is interested in the road. The Court is also asked to direct that no payments be made from the net earnings except to the bondholders.

Atlanta & Richmond Air Line.

The trains of the Richmond & Danville road no longer run through to Atlanta over this road, but stop at Charlotte, N. C., where passengers are transferred.

Pursuant to previous notice, the road was sold at public auction in Atlanta, Ga., Dec. 5, under a decree of foreclosure of the first mortgage, granted by the United States Circuit Court. The sale included the whole road, from Atlanta to Charlotte, 269 miles. The property was bought for \$1,600,000 for account of the bondholders. The amount of the first-mortgage bonds outstanding by the latest report was \$4,248,000.

Western North Carolina.

One of the first bills introduced in the North Carolina Legislature is to provide for the active prosecution of work on this road, both on the main line to the southwestern extremity of the State at Ducktown and on the branch from Asheville down the French Broad to Paint Rock. The bill appears to meet with no serious opposition, and will probably pass, the only questions being as to some of its minor provisions.

South Pacific Coast.

The track of this road is now laid from Dumbarton Point, Cal., southeast to Santa Clara, about 15 miles. The work of grading is progressing steadily between Santa Clara and San Jose. The road has been located for the whole distance to Santa Cruz and work is soon to be begun south of San Jose. To reach Santa Clara some very expensive bridge and pile work was required.

Louisville, New Albany & St. Louis.

Holders of first-mortgage bonds are notified to appear and prove their claims before Noble C. Butler, Special Commissioner in the foreclosure suit, at his office in New Albany, Ind., Dec. 20.

Auction Sales of Railroad Securities.

In New York, Dec. 6, at auction, Southern Central first-mortgage bonds brought \$9; Galveston, Houston & Henderson first-mortgage, 75; Dutches & Columbia first-mortgage, 20; Milwaukee & Northern first-mortgage, 5; South Mountain first-mortgage bonds, \$15.50 per \$1,000 bond.

Louisville, Cincinnati & Lexington.

A Louisville dispatch states that the sale of this road, which was to take place on Dec. 4, has been postponed by order of the Chancellor. It is said that this was done at the request of a number of bondholders who desired more time to perfect their arrangements for purchasing it.

A report that the road was to be bought by or in the interest of the Pennsylvania Company is denied.

Columbus & Mineral Valley.

An assessment of 10 per cent. on all subscriptions to the stock has been ordered, payable Jan. 1. The contract for the grading of the line from Columbus, O., to a connection with the Ohio Central at Bush Station is to be let soon. The intention is to build to Bush Station, use the track of the Ohio Central and the Cincinnati & Muskingum Valley roads from that point to Moxahala, and then to build from Moxahala by Ferrara into the Hocking Valley coal field.

Lockport & Buffalo.

Work on the grading of this road is now in progress along the whole line from Lockport, N. Y., to Tonawanda. From Lockport to Martinsville the grading is let to contractors, but from that point to Tonawanda it is being done by the company directly.

Cairo & St. Louis.

The strike on this road appears to be over and trains are running regularly. There is still bad feeling, however, and some of the new enginemen have been assaulted by the discharged strikers, with whom most of the other train-men are said to sympathize.

The Hoosac Tunnel Line.

The new location of the State road east of the Hoosac Tunnel is so far completed that construction trains run over it. The connection with the Fitchburg tracks at Greenfield will be completed in a few days, when all trains will use the new road. It is much better than the old line in grades, with less curvature.

The Boston *Advertiser* of Dec. 5 says: "We learn that the Boston & Albany and New York Central Railroad companies are engaged in a new movement to secure control of the Hoosac Tunnel Line. Already they have obtained control of what is known as the Troy & Boston Railroad, and we are informed that during the past week the President and Treasurer of that corporation have had interviews with Gov. Rice and other officials with the view of obtaining from the State the control of the Hoosac Tunnel and Troy & Greenfield Railroad, owned by the State, either by purchase for four million dollars with payment guaranteed by the Boston & Albany and New York Central railroads, or by a perpetual lease."

Missouri & Western.

Work is progressing actively on the extension of this road from its present terminus at Brownsville, Kan., to Oswego. The bridges over Spring River and the Neosho River are up,

and tracklaying is making good progress. It is expected that the track will reach Oswego by the close of the year, which will make the road 75 miles long from the junction with the Atlantic & Pacific at Carthage, Mo. It is probable that the road will next year be extended to Independence, 40 miles beyond Oswego.

Southern Railway & Steamship Association.

This association held a short meeting at Atlanta, Ga., last week, when the report of Mr. Virgil Powers, General Commissioner, was presented. A committee, consisting of Messrs. E. W. Cole, Nashville; Chattanooga & St. Louis; W. J. McGrath, South Carolina; J. W. Sloss, South & North Alabama; J. B. Palmer, Charlotte, Columbia & Augusta; W. McRae, Western & Atlantic, and Gen. G. M. Sorrell, was appointed to prepare a plan for the continuance of the association, which will expire by limitation Dec. 31. The committee will report to an adjourned meeting to be held in Atlanta, Dec. 14.

Washington City, Virginia Midland & Great Southern.

In the Graham suit, in which President Barbour was appointed Receiver, D. H. Lindon and others, creditors, recently applied to the Virginia Circuit Court for leave to file a petition, in which among other things they asked that the present Receiver be removed; that the payment of the interest on subsequent mortgages be suspended for the present, and the net income be applied to the payment of prior mortgages now due, thereby increasing, it is alleged, the value of subsequent mortgages.

Argument in the case was heard Nov. 24, and the Court subsequently refused to grant leave to file the petition upon the ground that under the present state of the pleadings the case is ready for a decree of reference to a commissioner, before whom all creditors will have an opportunity of presenting their own claims and contesting the claims of all others. The Court was of opinion that there was no ground whatever for the removal of Mr. Barbour as Receiver.

The object desired by the petitioners was to secure the appointment of a receiver opposed to the present management and to the controlling interest of the Baltimore & Ohio.

Texas & New Orleans.

This road has been formally opened for the whole 108 miles from Houston, Tex., eastward to the Sabine River at Orange by the passage of an excursion train over the line with a number of invited guests. A good deal of freight, chiefly cotton, is passing over the road. Boats are to be run on the Sabine and Neches rivers in connection with the road.

Erie & Chicago Line.

This line, organized something over a year ago, for running passenger cars through by way of the Erie and Atlantic & Great Western to Cleveland, and thence by the Cleveland, Columbus, Cincinnati & Indianapolis and the Baltimore & Ohio to Chicago, was suspended Dec. 3, and now and hereafter the through cars from the Erie will run over the Atlantic & Great Western to Mansfield, and thence over the Pittsburgh, Fort Wayne & Chicago to Chicago. This line is not much different in length from the other, but does not pass through Cleveland nor any other town of equal importance.

Boston & Philadelphia Through Line.

This line, it will be remembered, was established last spring, its trains running over the New York and New England from Boston to Willimantic; the Hartford, Providence & Fishkill, from Willimantic to Hartford, and the New York, New Haven & Hartford to Mott Haven, whence the trains are carried by a steam ferry-boat to Jersey City and taken by the Pennsylvania to Philadelphia. This line has been so successful that it is intended to continue running it through the winter. The night train from Boston will carry a sleeping car for Washington, and it is proposed to add to the morning train a through car for Richmond, Va., and, if sufficient travel is offered, a weekly through car for Florida passengers.

Florida Through Trains.

Arrangements have been made to run a through sleeping coach once a week from St. Louis to Jacksonville, Fla., passing over the St. Louis, Iron Mountain & Southern and the Nashville, Chattanooga, & St. Louis roads. South of Chattanooga the route will be by Atlanta and Macon.

The Macon & Brunswick road will run a through express from Macon, Ga., to Brunswick for Florida travel in connection with lines north and west of Macon. The connection will be completed by a steamboat line from Brunswick to Fernandina, connecting there with rail route to Jacksonville.

Chicago & Lake Huron.

The tracklayers on the gap between Flint, Mich., and Lansing have reached a point 40 miles west by south from Flint, leaving only six miles to be laid to reach Lansing. In preparation for the new business expected from the completion of the line 300 cars and a number of engines have been contracted for, and arrangements made for the use of a large number of Grand Trunk cars.

It is said that arrangements have been completed to organize a fast freight line to run between Chicago and eastern points, passing over this road and the Grand Trunk. It will be known as the Chicago & Great Eastern Line.

Mobile & Ohio.

A circular has been issued by Moran Brothers and others in opposition to the plan of reorganization proposed by the trustees and others. The general grounds of objection are: 1. That the trustees, Messrs. Duncan and Elliott, have favored floating debt creditors. 2. That \$736,000 of coupons from first mortgage bonds paid for the company prior to May, 1876, are now presented as a first-mortgage claim; and, 3. That the Tennessee State claim of \$2,000,000 and upwards should not take precedence of first-mortgage bonds.

To this circular Mr. Wm. Butler Duncan has replied by another, in which, after denying some statements as to his personal action, he says:

"Among the most important questions to be settled before a decree determining the rights of parties can be had are:

"1st. The claim of the Tennessee bonds to a first lien for principal and interest, amounting to say \$2,000,000 upon the 118 miles within the State of Tennessee.

"2d. The claim of the second-mortgage trustees that the interest arrearage bonds do not have priority over the second mortgage, involving say \$3,000,000.

"3d. The claim of the second-mortgage bondholders to priority over all the other mortgages, upon certain parts of the property of the company.

"4th. The claims of the holders of the unpaid coupons of 1874 to priority of payment, with interest; and numberless other minor claims and disputed questions.

"Even if a decree of sale could be obtained before these conflicting claims can be settled (which is very improbable), no valuation can be placed upon any security of any grade, and therefore no sum can be fixed at which any particular security can be turned into court on account of the purchase money; and, therefore, the property will have to be sold absolutely for cash, and thus be at the mercy of speculators, and the meagre proceeds of the sale will have to remain for a long period undivided."

Mr. Duncan thinks that his plan, being a compromise between the various interests, will prevent much litigation and will enable the property to be taken out of court much sooner than a plan which disregards the holders of the detached coupons and the Tennessee substitution bonds, which will certainly lead to further litigation. Moreover, his plan provides

for a much smaller obligatory interest charge than the new one, which provides for a first mortgage of \$9,000,000. He says that his affairs in connection with the trusteeship have been managed by competent counsel, and his aim as Receiver has been to manage the property for the best interests of its owners, and to improve its condition as much as possible. He says, in conclusion:

"Under the agreement of Oct. 1, 1876, the Committee informed me that first mortgage and Tennessee bondholders have already become parties, and have transferred their bonds to the Committee to the amount of over \$3,750,000, without estimating any unpaid and matured coupons."

Meetings.

The following companies will hold meetings at the times and places given:

Cleveland & Pittsburgh, annual, at the office in Cleveland, O., Jan. 3. Transfer books are closed from Dec. 4 to Jan. 4.

Richmond & Danville, annual, at the office in Richmond, Va., Dec. 18, at noon.

Central of Georgia, at the company's banking house in Savannah, Ga., Jan. 1, at 10 a. m.

Washington & Ohio, annual, adjourned from Nov. 15, at the office in Alexandria, Va., Jan. 10.

New York, New Haven & Hartford, annual, at the company's office in New Haven, Conn., Jan. 10.

Ottawa, Oswego & Fox River Valley.

In the long pending suit concerning the town bonds issued in aid of this road, the United States Supreme Court has affirmed the decision of the Circuit Court and holds that the bonds are valid and must be paid.

Baltimore & Ohio.

The Baltimore *Gazette*, of Dec. 2, says:

"By the winter schedule of the Baltimore & Ohio Railway, which went into effect yesterday, the number of regular trains daily has been greatly lessened, and as a natural consequence will result in a considerable reduction in the force of train hands. General anxiety was manifested among the men at Camden Station yesterday at the prospect. The actual number of persons affected will not be known for several days. The movement will commence with conductors, who will be reduced merely in rank and placed in charge of baggage cars. The baggage masters thus displaced will assume the position of brakemen, while a corresponding number of the latter will be placed on what is known as the extra list, with the choice of taking their chances as substitutes. During the recent Centennial season the increased amount of passenger traffic particularly resulted in numerous temporary promotions, and the majority of the changes anticipated will be the result of this extra business coming to an end."

Pennsylvania.

With the close of the Centennial traffic a considerable reduction is being made in the passenger train force. This reduction began with the train agents, or collectors, a number of whom have already been discharged. It is said also that many of the conductors temporarily promoted to passenger trains will be sent back to freight trains and that many brakemen and others will soon be discharged.

Dividends.

Dividends have been declared by the following companies:

New York & Harlem (leased to New York Central & Hudson River), 4 per cent., semi-annual, payable Jan. 2.

Boston, Revere Beach & Lynn, 2 per cent., quarterly, payable Dec. 15.

Chicago, Milwaukee & St. Paul.

The La Crosse (Wis.) *Republican* thus describes the new bridge over the Mississippi near that city:

"The work was begun June 10 and the whole structure was completed on Sunday, Nov. 26, together with over a mile of trellis work approaches."

"The total length of the structure from the eastern bank of the Black River to the Minnesota shore is 1.8 miles, and that of the bridge proper, over the channels of the Mississippi, 1,688 feet with 660 feet of trellis work across Campbell's Island. The whole of the superstructure of the bridge is of iron and was turned out by the American Bridge Company—a large portion of the material used being the product of Wisconsin—and consists of five spans of 150 feet each over the east channel of the river; across the west channel are two spans of 164 feet each, one of 250 feet and the draw span of 360 feet. There is nothing particularly showy about the entire fabric, but everything is constructed in a handsome and substantial manner that does credit not only to the company but to the contractors who have so faithfully performed their work."

"The draw of the bridge was swung into place on Saturday evening and found to fit perfectly, and yesterday afternoon the track was laid connecting the roads on the two shores. A test was given to the structure later in the day by the passage of 40 heavily laden freight cars, and the result was most gratifying to all the officials of the company who witnessed the trial."

"The contract test of the bridge was made this afternoon by a double loaded freight train, and the strain was found to be remarkably sustained by every portion, though it nearly approached the factor of ten, on which the bridge was built."

The through passenger and freight trains are now running regularly over the bridge. It is also to be used by the trains of the Chicago, Dubuque & Minnesota road. Its cost is stated to be about \$500,000.

Little Rock, Mississippi River & Texas.

This company has accepted a donation offered of a large tract of land at Arkansas City, Ark., for depot and shop purposes, and has decided finally to make that place the permanent Mississippi River terminus. The new line is all located and staked out, but it will be necessary to get authority for the change of line from the Legislature. As soon as that can be done, the contracts will be let and the work done as fast as possible. When the southeastern end of the line is thus completed and located so that it will not be washed away every year, as has been the case with the old line, the company will begin work on the extension from Pine Bluff to Little Rock.

Minneapolis & St. Louis.

The St. Paul *Pioneer-Press* says that arrangements have been completed to begin work in the Spring on the extension of this road southward to Albert Lea, Minn., where it will connect with the Southern Minnesota, and where it is expected to meet an extension northward of the Burlington, Cedar Rapids & Northern road. The extension will pass through a well-settled country, with much good timber on the line, and will afford a route to the Minnesota towns for Iowa coal, but parallel roads already in operation are not able to earn fair interest on their cost.

Port Dover & Lake Huron.

The stockholders have voted to authorize an issue of £95,000 sterling 6 per cent. bonds. These bonds are to be sold in London and with the proceeds the existing bonds are to be retired and the floating debt paid off.

Little Rock & Fort Smith.

To reach the present terminus of this road at Cherokee, opposite Fort Smith, on the Arkansas River, about two miles of track was laid in the Indian Territory. The chiefs of the Cherokee Nation, to which this section of the Territory belongs, now claim that this is in violation of law, and that the company must remove so much of the track as is within the

Cherokee limits. If this is done the company will be obliged to make the terminus some two miles from Fort Smith, or else to bridge the Arkansas, which would be an expensive work.

Newport & Maysville.

A meeting is to be held in Newport, Ky., Dec. 19, to organize this company under a charter granted by the Kentucky Legislature in 1852, which is still good. The proposed line is from Newport east by south up the Ohio River to Maysville, about 55 miles.

Shenango & Allegheny.

It is said that this road is to be extended to a connection with the Parker & Karns City near Parker, Pa.

St. Joseph, Iowa & Minnesota.

A new road is projected to run from St. Joseph, Mo., north by east across the whole State of Iowa and into Minnesota to connect with some of the lines leading to St. Paul. The project has not taken very definite shape as yet.

Wisconsin Central.

The tracklayers on the Main Line have reached Butternut Creek, eight miles north of the late terminus at the Flambeau River, and 135 miles from Stephens Point. On the northern end the track has been extended from Penokee southward to the Chippewa River, 12 miles. Work is now suspended for the winter, leaving a gap of about 10 miles, on which track will be laid early in the spring. The company will soon put on through trains from Milwaukee to Ashland, making connections over the gap in the road by stage.

Cazenovia, Canastota & De Ruyter.

It is reported that the Utica, Ithaca & Elmira Company is negotiating for the purchase of this road from the bondholders who recently bought it at foreclosure sale.

Burlington, Cedar Rapids & Northern.

The City Council of Burlington, Ia., has been urging upon this company the carrying out of the contract made with the city whereby the principal repair shops and the principal stockyards were to be located in Burlington, and other improvements made. The chief repair shops are now in Cedar Rapids, which is claimed to be in violation of the contract.

Bedford, Brownstown & Madison.

At a meeting of the Executive Committee called by President Hargan and held at Madison, Ind., recently, Chief Engineer McElfatrick was ordered to proceed at once to locate the road. He will begin work at Madison.

Lafayette, Muncie & Bloomington.

The suit of John B. Ayer and others against this company came up last week in the Delaware County (Ind.) Circuit Court on the motion for the appointment of a receiver. After some argument it was put over to Dec. 5.

Gulf, Colorado & Santa Fe.

This company has bought an additional lot of iron, which is now on the way to Galveston. The company expects to complete 50 miles of road out of Galveston by Jan. 1, which will secure the payment of the whole of the Galveston subscription of \$500,000. A contract will then be let for the further extension of the road, and the work will be prosecuted actively. With the exception of the long bridge over Galveston Bay the work on this 50 miles has been very light and its cost small.

Joplin & Girard.

This road is now completed from Girard, Kan., east by south 20 miles to the coal fields of Baker township, Mo. The mines on the road are already worked to a considerable extent, and the company has made several heavy contracts for carrying coal.

Houston & Texas Central.

On the extension of the Waco Branch a farther contract has been let to Joseph Brennan for the grading as far as Cleburne, Tex., 55 miles north by west from Waco. It is said that another contract for the 35 miles from Cleburne to Weatherford will be let soon. The extension is being pushed forward, it is said, in order to prevent the diversion of the trade of the country north of Waco to the Texas & Pacific.

Covington, Flemingsburg & Pound Gap.

The section of five miles, from Flemingsburg, Ky., to Johnson's, which has been graded some time, is now being finished up and the ties distributed. The rails have been ordered and will be laid as soon as they arrive.

Painsville, Oanton & Bridgeport.

A number of subscriptions were made to the stock of this company on condition that the section from Chagrin Falls, O., to Solon, about five miles, should be completed during the fall season just closed. The contractors, Richie & Co., failed to finish the work in time, and the company has asked the subscribers for an extension, which will probably be granted.

Syracuse, Geneva & Corning.

A correspondent informs us that the work of grading on this road is being pushed rapidly forward by the new contractor, Mr. George McFee.

Lehigh & Eastern.

The contractors, Williams & Wood, having failed to go on with the work according to agreement after a very short trial, the contract has been annulled. An assessment on the stock subscribed has been made, and the company is arranging to pay off all bills incurred and to go on with the work. A committee has been appointed to secure the right of way wherever it has not already been done.

Paducah & Memphis.

In Memphis, Nov. 27, in the United States Circuit Court the final decree of foreclosure and sale of this road was ordered to be entered, on the petition of the first-mortgage bondholders. The road is completed from Paducah, Ky., south by west to Trimble, Tenn., 78 miles, and from Memphis, Tenn., north by east to Covington, 37 miles, leaving a gap of 53 miles, from Trimble to Covington, most of which is graded.

New York & Oswego Midland.

The appeal to the United States Supreme Court from certain parts of the decree of foreclosure and sale, which has been allowed, will not stay the sale, as exception was not taken to the decree as a whole, but only to those portions directing the payment from the proceeds of the sale of certain money advanced to pay coupons in July, 1873, and of the Receivers' certificates. The amount thus in dispute is about \$2,000,000.

Mr. Kenneth G. White, Master in Chancery of the United States Circuit Court, gives notice that he will sell the property at public sale in Middletown, N. Y., March 23, at noon. The sale will include the Main Line, from Middletown to Oswego, 249 miles; the Ellenville Branch, from Summitville to Ellenville, 5 miles; the Delhi Branch, from Walton to Delhi, 17 miles; the New Berlin Branch, from Guilford to New Berlin, 22 miles, and the Cortland Branch, from Norwich to Cortland, 48 miles, 341 miles in all; also the rights and franchises, with all equipment and personal property and all leasehold rights belonging to the company. These are excepted from the sale the Western extension, from Freeville to Scipio, which was covered by a separate mortgage and has already been sold, and a number of small tracts of land covered by mortgages to individuals.

The sale will be made subject to all judgments and claims

for right of way and claims for labor and materials furnished the Receivers, the last class of claims not to exceed \$50,000. Should no bid amounting to \$2,500,000 be received, the Master will adjourn the sale subject to further order of the court. The purchasers will be required to pay \$100,000 in cash at the time of sale, and, on delivery of the deed, so much additional in cash as shall be required to pay the Receivers' certificates and debts, the costs of the suit and sale and all unpaid taxes. The balance of the purchase money may be paid in Receivers' certificates, or in the first-mortgage bonds and unpaid coupons.

The leasehold interest in the Utica, Clinton & Binghamton and the Rome & Clinton roads will be sold separately, if the trustees so direct.

Utica & Ilion.

An adjourned meeting in favor of this road was held in Utica, N. Y., Nov. 29. The engineer reported that most of the landholders on the line would give the right of way and the expense under that head would not be more than \$3,600; the road could be built for \$110,000. After some speaking in favor of the road the meeting passed resolutions endorsing the project, and adjourned subject to the call of the chairman.

Bangor & Piscataquis.

At the adjourned meeting of the stockholders in Bangor, Me., Nov. 28, it was voted to terminate the lease of the road to the European & North American. It was also voted to run the road independently and a committee was appointed to make the necessary arrangements.

Pennsylvania Canal.

It is said that a railroad track is to be laid in the bed of this canal from Huntingdon, Pa., west to Williamsburg.

Rochester, Nunda & Pennsylvania.

A current report that the Lehigh Valley Company was negotiating for the purchase of the finished section of this road is denied by authority.

Intercolonial.

To meet the great demand for cars orders have been given to build 500 box cars in the Moncton shops and 200 more are to be built in outside shops. At Moncton also 11 heavy snow plows and six flangers are in course of construction.

Ohio Falls & White River.

This company has filed articles of association in Indiana, and purposes building a narrow-gauge railroad from Jeffersonville north by west to Medora in Jackson County, about 50 miles. The capital stock is to be \$1,000,000, with power to increase if necessary.

Montreal, Portland & Boston.

The contractors, McFarlane & McRae, are pushing work on the grading between Champlain, P. Q., and West Farnham, and intend, if the weather permits, to have that section completed by Christmas. This will complete the line from St. Lambert to West Farnham, and the connection at the latter place with the Southeastern and the Stanstead, Sherbrooke & Champlain roads. In the spring the road is to be extended from West Farnham south by east to the Vermont line near Freleighsburg, where connection will be made with a branch of the Portland & Ogdensburg. On the northern end the road is also to be extended from St. Lambert to Longueuil, whence a steam ferry will be run across the St. Lawrence to Montreal. The company has finally secured a grant of \$4,000 per mile from the Quebec Government.

Denver & Rio Grande.

Mr. L. H. Meyer, surviving trustee, has called a meeting of the first mortgage bondholders, to be held in New York, March 1, 1877, for the purpose of choosing a new trustee under the mortgage.

The operations of the Main Line, 120 miles, for September are reported as follows:

Freight.....	\$17,618 73
Passenger.....	15,129 74
Miscellaneous.....	546 36
Total earnings (\$32 per mile).....	\$33,794 82
Expenses (68.22 per cent.).....	23,054 70

Net earnings (\$90 per mile)..... \$10,740 12

To the net earnings are to be added whatever the referees may award as the company's share of competitive earnings on Denver and La Junta business. As compared with September, 1875, there is an increase of 16.8 per cent. in gross and 1.3 per cent. in net earnings. Of the gross earnings this year \$815.82 were from troops, mails and Government freight.

The receipts of the Trinidad Extension, not included with the above, but credited to construction, were \$13,416.07 in September.

Kansas & Nebraska.

A special meeting of this company is to be held in Maryville, Kan., Jan. 19, to vote on an agreement of consolidation with the St. Joseph & Pacific Company. The company is that organized by the bondholders of the Western Division, St. Joseph & Denver City Railroad.

St. Joseph & Pacific.

A special meeting of the stockholders is to be held at Elwood, Kan., Jan. 18, to vote on an agreement of consolidation with the Kansas & Nebraska Company. The company is that organized by the bondholders who bought the Eastern Division of the St. Joseph & Denver City Railroad at foreclosure sale.

Milwaukee, Lake Shore & Western.

It is said that when the bondholders bought this road and organized the present company they agreed to pay the claims of the employees for back pay for the months of May, June and July, 1875, amounting to about \$90,000. These claims have not yet been settled, and it is said that General Superintendent Reed has notified the company that he will withdraw from its service, unless a settlement is made by Jan. 1, 1877. It is said that the company still declines to pay.

Cleveland & Newton Falls.

A company by this name has filed articles of incorporation in Ohio and purposes building a railroad from Chagrin Falls in Cuyahoga County east by south to Newton Falls in Trumbull County, about 25 miles. The capital stock is to be \$50,000.

Maple River.

Grading on this new road is in progress in Carroll County, Iowa. It is said that the company intends to have some 30 miles from the junction with the Chicago & Northwestern ready for the rails in the spring.

Richmond & Three Forks.

Madison County, Ky., has voted to subscribe \$250,000 to the stock of this company. Estill and Lee counties are soon to vote on the same question.

Wilmington & Reading.

This road was sold at public sale in Philadelphia Dec. 4 under a decree of foreclosure of the first mortgage. It was bought for \$100,000 by Messrs. M. Baird, Edward S. Buckley, Lewis Waln, S. L. Dupont and Charles Baker, the Purchasing Committee appointed by the bondholders. The sale included the road from Wilmington, Del., to Birdsboro, Pa., 63 miles, but not the extension of nine miles from Birdsboro to Reading. Owing to a peculiarity in Delaware law, it includes only the

actual property in that State, the franchise not being covered by the mortgage, so that the purchasers will probably have to get a special act from the Delaware Legislature to enable them to incorporate and run the road in that State. Only a few miles of the road are in Delaware, most of it being in Pennsylvania.

Delaware & Bound Brook.

The suit brought to enjoin this company from building and maintaining its bridge over the Delaware at Yardley has been finally settled. The New Jersey Court of Errors and Appeals has affirmed the decision of the Chancellor denying the injunction. This result was generally expected.

Felton & San Lorenzo.

This company has filed articles of incorporation in California and purposes building a narrow-gauge railroad from Felton up the San Lorenzo River, thence along Bear Creek and Boulder Creek, a total distance of 32 miles. The capital stock is to be \$500,000. The road will be an extension of the Santa Cruz & Felton, and is intended to serve a lumber district.

Quebec Harbor Improvements.

The Quebec Harbor Commissioners will receive at their office in Quebec until Feb. 1, 1877, tenders for the construction of the following works:

1. A wall and an embankment, forming the north quay of the proposed South Tidal Harbor.
2. A wall and an embankment, forming the north quay of the proposed Southwest Dock.
3. The dredging out and the formation of a channel way parallel to both walls.
4. The construction of crib-work at the end of the embankment next to the gas works.
5. Crib-work and retaining walls adjoining the ballast wharf.
6. The construction of a bridge over the proposed 80-foot entrance in the north wall of the South Tidal Harbor.

Plans, specifications, bills of quantities and forms of tender can be seen at the office of the Commissioners in Quebec. Printed copies of the specifications and bills of quantities will be furnished to intending contractors upon making a deposit of \$50, to be returned, after the tenders are opened, to parties sending in bona fide bids. No bids will be received except on the printed forms furnished.

Atlantic, Mississippi & Ohio.

The Receiver's report for October is as follows:

Balance, Oct. 1.....	\$126,522 24
Receipts for the month.....	197,787 74
Total.....	\$324,309 98

Disbursements for the month..... \$19,848 10

Balance, Nov. 1..... \$204,461 88

The receipts were \$77,939.64 in excess of the disbursements for the month.

Central, of New Jersey.

The shops at Hampton Junction, N. J., are to be closed and the work taken to the Phillipsburg and Elizabethport shops. Since the practical closing of the Delaware, Lackawanna & Western connection at Hampton there has been very little use for repair shops there, and their continuance was merely a source of unnecessary expense.

Lake Shore & Michigan Southern.

In the matter of the application of Rufus Hatch and others for a *mandamus* to compel the officers of this company to allow them to examine the stock books of the company, argument was had last week before the New York Supreme Court. It appears that the statute of New York provides that companies in the State are obliged to open their stock books for inspection only for 30 days before the annual meeting, but foreign corporations having a transfer agent in the State must keep the transfer books open to inspection at all times. The principal argument was therefore on the question as to whether the company was properly a foreign corporation or not. The company represented that a large majority of the stockholders objected to the inspection of the books, and that there was no good purpose to be served by it.

Baltimore, Pittsburgh & Chicago.

The stockholders of the Illinois Division met in Chicago, Nov. 29 and voted to change the name of the company to Baltimore, Ohio & Chicago, the name adopted by the recently consolidated Ohio and Indiana companies.

Ogdensburg & Lake Champlain.

The question of continuing the receivership was argued before the New York Supreme Court at Schenectady Nov. 28 by counsel for the company and for the Central Vermont. The principal point made for the Central Vermont was that the Ogdensburg & Lake Champlain Company, in default of payment of rent, should have applied for relief to the Vermont Chancery Court, from which the Central Vermont derives its authority. To this it was replied that the road was not properly included in the Vermont trusteeship, and the only relief to be had was to be found in New York. The Court reserved its decision, continuing the temporary Receiver in charge for the present.

North Wisconsin.

This company is said to have completed arrangements to resume work early next year. The intention is to build during the year 20 miles of road, from the present terminus northward to Rice Lake.

Transportation of Goods in Bond.

The English Minister having called the attention of the Secretary of the Treasury to the fact that the regulations requiring goods sent from Canada in sealed cars for exportation from American ports to be examined at the frontier customhouses were not in harmony with the provisions of the Treaty of Washington, the Secretary has ordered that the rules complained of be abolished. The rules now in force are those of 1864, which provide that goods in transit for export shall pass without examination, provided the cars are sealed with the consular seal at the place of shipment and are sent to their destination by a continuous route.

Atlantic & Great Western.

There was a meeting in London last month of some of the holders of the "leased line rental trust" bonds of 1873 of this company. The report of it consists chiefly of the questions put by Mr. Joseph Tucker to Mr. James McHenry, and the latter gentleman's replies. Mr. McHenry said that he believed the securities to be good when the issue was made, and believes so still (they are worth about 16 on the London Exchange), and that the Erie guarantee is valid; he proposed to apply for the appointment of a receiver, and suggested a Mr. Davenport, of New York, as the proper man. "The first thing to be done," he said, "is to receive the earnings of the Shenango & Allegheny road available under the Erie guarantee." Mr. McHenry apparently proposed to conduct the proceedings at his own expense, for the present, agreeing not to call upon the bondholders for more than 1 percent of their holdings for such expense, and that not until their bonds reach a value of 50 per cent. in the market. Mr. Henry Wallaston Blake, one of the trustees of these bonds, spoke in favor of the proposed action. The amount of these bonds is £900,000, but £174,000 were never issued, and Mr. Blake holds them still. Bischoffsheim & Goldschmidt contracted to take the whole issue, but afterwards, at their request, General McClellan consented to modify the agreement, and they took only £600,000 firm. Mr. McHenry

said that no commissions were paid on the issue. Bischoffsheim & Goldschmidt took £600,000 at 85 firm, and sold them to the public at 89. The meeting passed unanimously the question put by Mr. Joseph Tucker: "Do you give Mr. McHenry your support for securing the appointment of a receiver in America on our behalf, whose name shall be submitted to a future meeting of the bondholders, to be called by myself?" Mr. McHenry said it was a question of law whether such a receiver could be appointed, but he would begin the necessary proceedings at once.

After the meeting news was received that the Shenango & Allegheny Company had declared a dividend of 10 per cent., and the Mercer Mining and Manufacturing Company one of 2 per cent. on the shares held by the London trustees.

The comparative statement of expenses of engineering department on this road for August, 1876, shows \$48.41 for labor and \$40.05 for supplies per mile of track; against \$58.96 for labor and \$38.82 for supplies in 1875. The total expense was thus \$88.46 this year and \$97.80 last—a decrease of nearly 10 per cent.

RAILROAD LAW.

Charter Exemption from Taxation.

In the case of the State of Louisiana against Morgan, on appeal from the Supreme Court of Louisiana, the United States Supreme Court has affirmed the decision of the State Court and holds that Mr. Morgan, who holds the road now known as Morgan's Louisiana & Texas, but formerly the New Orleans, Opelousas & Great Western, as purchaser at judicial sale, is not entitled to exemption from taxation on the property because it was exempt while in the hands of the original company. The Court holds that the franchises passing by the sale are only those necessary to the maintenance and working of the road, such as the right to run cars, to take tolls, to take earth or gravel for the road-bed, water for locomotives, etc. Exemption from taxation is not essential to the franchises but is a personal right or privilege and cannot be transferred without express statutory authority.

In this decision the Court adheres to its usual policy, which is to limit exemption from taxation by the strictest possible construction of statute law.

Discrimination in Rates—The Tennessee Law.

The Supreme Court of Tennessee, in a case of the State against the Louisville & Nashville Railroad Company, decided the following points at Jackson recently:

1. Under the act of 1865, ch. 69, no railroad is liable to indictment for discriminating against any town or city, which has not received aid from the State since the passage of the act, under said act or the general act of 1852.

2. The act of discrimination is not declared a misdemeanor by statute, and no remedy being provided specially, no indictment lies, but only an action of debt for penalty.

Mechanics' Liens and Railroad Mortgages.

The Central Law Journal, of St. Louis, says: "We call attention to the opinion of the Supreme Court of Iowa, published in this number, in the case of Nelson, et al. v. The Iowa Eastern Railway Company, et al., holding that a mechanic's lien dates from the commencement of the structure, and is paramount to a mortgage executed after the commencement of the structure, though before the particular work was done or materials furnished for which the lien is claimed. This decision has been arrived at after a rehearing by the full court, and overrules the former judgment of the court, delivered at the October term, 1875, which we published at the time, and which we then took occasion to criticize. The decision of the points involved, and the rule as laid down by the court, in their last opinion, seems to be both common sense and good law."

A brief statement of the case, which was a suit for ties furnished, is as follows: The road in question was first owned by a company called the Cassville, Milwaukee & Montana Railway Company, which was incorporated May 2, 1871. The intervenors in this action subscribed to the stock of that company. The defendant, the Iowa Eastern Railway Company, was incorporated Feb. 9, 1872. March 23, 1872, the former company conveyed the road to the latter, in consideration, among other things, that the latter would pay the debts of the former, and execute its mortgage bonds to the intervenors in payment for their claims for subscriptions. Feb. 16, 1872, the latter company executed its mortgage upon the road to secure said bonds, which mortgage was filed for record March 6, 1872. The bonds were executed later. At the time the mortgage was executed 16 miles of the road had been graded. The ties in question were furnished in April and May, 1872. The statement for a lien was filed in July, 1872.

The final decision of the court is expressed in the following summary:

"A mechanic's lien dates from the commencement of the structure, and is paramount to a mortgage executed after the commencement of the structure, though before the particular work was done, or materials furnished, for which the lien is claimed."

Actions Against Receivers.

In the case of Scott against Thompson, Receiver, the United States Circuit Court for the District of Iowa recently held:

1. A person who brings an action in one court, against a receiver appointed by another court without the consent of the court whose officer such receiver is, is guilty of a contempt of the latter court; and this is so although such doctrine may not result in disturbing the possession of the receiver. This doctrine applies with peculiar force to cases where suits are brought in the State courts against receivers appointed by the Federal courts, in actions brought by citizens of other States, to foreclose railway mortgages.

2. In such cases, the proper practice is for the person having a demand against the fund in the hands of the receiver, to bring his demand into the court appointing the receiver, and the court will direct him to be examined, *pro interessu suo*, before the master, and if, upon admitting his claim, the court finds it to be a just one, it will direct the receiver to pay it without litigation; but if the court finds the claim to be a doubtful one, it will give the claimant leave to prosecute it against the receiver before some competent court—consulting herein the convenience of parties and exercising a judicial discretion.

ANNUAL REPORTS.

Mississippi & Tennessee.

This company works a line from Memphis, Tenn., southward to Grenada, Miss., 100 miles, connecting at the last-named place with the New Orleans, St. Louis & Chicago road. The present report covers the year ending Sept. 30, 1876.

The equipment consists of 12 locomotives; 11 passenger and 5 baggage and mail cars; 4 caboose, 80 box, 44 flat and 8 stock cars; 6 boarding and tool, 12 hurdle and 14 hand cars.

The capital account at the close of the year was as follows:

Stock (\$8.254 per mile).....	\$825,400 00
Funded debt (\$21,731 per mile).....	2,173,074 00
Floating debt (\$1,011 per mile).....	101,120 00

Total (\$30,996 per mile)..... \$9,099,594 03

Bills receivable, cash and cash assets amounted to \$91,987. During the year the funded debt was decreased by \$92,870, and the floating debt by \$11,524.72; all interest obligations were promptly met.

The train mileage for the year was as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passenger trains.....	122,438	140,415	Dec. 17,977	12.8
Freight trains.....	69,166	66,407	Inc. 2,759	4.2
Switching and service mileage.....	46,058	43,065	Inc. 2,973	6.9
Total.....	237,662	249,907	Dec. 12,245	4.9

Average receipt per mile passenger trains..... \$0.995

Average receipt per mile freight trains..... 3.995

Average receipt per mile all trains..... 2.240

Average expense per mile all trains..... 1.085

Net earnings per mile all trains..... 1.155

The total cost of engine service was 21.78 cents per train mile run. The cotton carried during the year was as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Local points to Memphis, bales.....	66,128	43,138	Inc. 22,990	53.3
Local points to Grenada for New Orleans.....	10,303	6,838	Inc. 3,465	50.9
Grenada, through to Memphis, through for New Orleans.....	2,986	6,612	Dec. 3,076	55.7
Total.....	42,856	33,979	Inc. 8,877	27.0

The cotton crop along the line of the road was large, producing a corresponding increase both in the tonnage and the earnings.

The earnings for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers.....	\$126,168 43	\$128,328 42	Dec. \$2,159 99	1.7
Freight.....	330,168 23	312,725 97	Inc. 17,442 26	5.6
Express and mails.....	11,263 10	13,000 00	Dec. 1,736 90	13.4
Privileges.....	1,672 24	1,856 35	Dec. 184 11	9.7
Total.....	\$469,272 00	\$459,910 74	Inc. \$13,361 26	2.9
Expenses.....	227,473 70	244,578 03	Dec. 17,104 33	7.0

Net earnings... \$241,798 30

Gross earnings per mile..... 4,692 72

Net earnings per mile..... 2,417 98

Per cent. of exps... 45.48

The result of the year was as follows:

Net earnings..... \$241,798 30

Interest..... \$165,762 28

Miscellaneous and legal expenses..... 11,566 48

Mississippi State tax..... 6,586 87

Surplus..... \$87,893 67

During the year the equipment was kept in good order and many improvements made. There were used in repairs of track 144 tons new iron, 345 tons re-rolled iron, all 60 pounds per yard and fish-bar patterns, and 30,751 new ties; 4,250 feet of pile trestle were built besides ordinary renewals and repairs. The bridges and trestles are in good order, but, being of wood, require constant renewals. A new Howe truss is ready to be substituted for the present Nonconnah bridge as soon as the high water subsides enough to allow the piers to be built. Several cuts and embankments have been widened.

Trains have been run with regularity and freedom from accident. The loss and damage account was only \$154.49, showing care on the part of employees. The increase in freight was entirely in cotton, other freights showing a decrease.

Superintendent Burke recommends the extension of the track in Memphis to the river and a connection with the other roads there at Centre Landing, so as to avoid the delay and expense now incurred by the transfer of through freight.

Naugatuck.

This company owns a line from Stratford Junction, Conn., northward to Winsted, 57 miles, and its trains run over four miles of the New York, New Haven & Hartford track, from Stratford Junction to Bridgeport. It worked up to the beginning of last year the Watertown & Waterbury road, 4½ miles, and still continues to furnish train service under contract. The present report covers the year ending Sept. 30, 1876.

The capital account at the close of the year was as follows:

Creditor:

Capital stock (\$33,856 per mile).....	\$1,918,400 00
Notes and accounts due.....	59,210 43
Profit and loss.....	275,512 42

Total (\$39,528 per mile)..... \$2,263,122 85

Debtors:

Construction and equipment (\$36,065 per mile).....	\$2,056,851 77
Railroad stocks and bonds.....	19,000 00
Camden Rolling Mill property.....	24,329 90
Real estate.....	35,412 79
Notes and accounts due company.....	41,279 48
Cash and materials on hand.....	76,248 91

Total..... \$2,263,122 85

The financial condition of the company is thus shown to be very good indeed, with no funded debt and really no floating debt, the property being represented entirely by stock and surplus earnings invested.

Train mileage for the year was as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
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Passenger.....	85,046	85,026	Dec. 20	0.7
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Freight.....	134,410	130,491	Dec. 3,919	3.0
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Service.....	26,976	22,441	Inc. 6,585	29.3
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Total.....	248,433	237,988	Inc. 10,474	4.4
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Of this service last year 10,529 miles was on the Watertown & Waterbury road, so that the same mileage was covered both ways.

The earnings for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
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Passengers.....	\$187,602 74	\$186,228 69	Inc. \$1,378 91	0.7
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Freight and ice.....	264,893 64	262,899 23	Dec. 2,005 58	0.7
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Mails and express.....	18,103 50	17,374 08	Dec. 729 47	4.3
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Miscellaneous.....	11,104 98	10,899 01	Dec. 205 97	1.9
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Total.....	\$501,604 86	\$501,396 09	Inc. \$208 77	0.5
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Working expenses.....	276,304 81	265,277 19	Dec. 16,027 62	6.2
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Taxes.....	19,215 36	18,791 14	Dec. 424 22	2.3
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Total.....	\$295,520 17	\$279,068 33	Inc. \$16,451 84	5.0
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Net earnings..... \$206,084 69

Gross earnings per mile..... 8,900 08

Net earn. per mile..... 3,615 53

Per cent. of working expenses..... 55.88

Per cent. of exps. and taxes..... 58.91

The income account was as follows:

Net earnings.....	\$206,084 69
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Interest.....	\$5,593 43
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Depreciation on Watertown & Waterbury bonds.....	2,000 00
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Dividends Nos. 41 and 42.....	186,855 00
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Surplus for the year.....	196,458 43
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Add balance Sept. 30, 1875.....	265,886 16
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Balance Sept. 30, 1876.....	\$275,512 13
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The report says: "The balance of outstanding mortgage bonds amounting to \$99,000, have been paid and cancelled during the fiscal year, and the company is free of all incumbencies."

"The construction and equipment account has not been increased, and the only additional charge to permanent expenditure account has been the sum of \$200 for real estate purchased; all other outlays being charged into current expenses."

"The lease of the Watertown & Waterbury Railroad by this company has expired by its own limitation, and that road is now operated for its own account, this company furnishing equipment, materials and labor therefor, on ordinary and reasonable terms."

Oil Pipe Lines.

TOTAL mileage of iron pipe used for conveying oil in the Oil Regions of Pennsylvania:

LINES.	Size of Pipe.		Total Miles.
2-in.	3-in.		

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